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Section of Ophthalmology

President—RANSOM PICKARD, C.B., M.S.

CLINICAL MEETING HELD AT THE CENTRAL LONDON OPHTHALMIC HOSPITAL, DECEMBER 14, 1934

Reattachment of the Retina after Discission of Soft Cataract.—MONTAGUE L. HINE, F.R.C.S.

In an article in the *Lancet* (1934, ii, 769), on "The Prognosis after Operation for Detachment of the Retina," Mr. Charles Goulden stated that, while a few successful cases of reattachment of the retina had been reported after operation on aphakic eyes, he had no knowledge that any case had been reported of successful operation on a detachment subsequent on removal of a soft cataract.

The present case is shown because, so far as I can determine, the retina has remained back in position for over six months following operation for detachment which occurred in an eye in which a lamellar cataract was "needled" in childhood.

The patient, a male, aged 52, had both eyes operated on for lamellar cataract when he was a boy. The right eye was removed owing to sepsis. With the left eye he had $\frac{6}{9}$ vision with plus 10 D sph., as shown by the old record.

In 1931 I saw him, as he was complaining of a "round watery ring" over things, noticed for the past six months, while he then had a green mist over the eye, followed by a black gauze. His vision was still $\frac{6}{9}$ with a plus 12 D sph., and there were no visible changes in the retina. The green mistiness diminished soon afterwards.

On April 4, 1934, he came again to see me, complaining that, on March 27, a ring had appeared at the bottom of the left eye, most marked to the nasal side and below. This then spread up the left side and parted in the centre, like two round halves.

Vision was hand-movements only. I could not get a field of vision charted.

A large detachment was present above, rather more on the nasal than on the temporal side. The view of the disc was obscured.

After instillation of atropine, and rest in bed at the Royal Westminster Ophthalmic Hospital, a round hole was found in the detached retina, about six disc-widths from the limit of examination, in the 10 o'clock meridian.

On April 9 a large wedge of sclerotic between the 9.30 and 10.30 meridians was punctured and stippled with Safar's points, the apex of the wedge extending backwards from the limbus 18 mm. This large area was treated in the endeavour to make sure of reattachment, which was obviously rather unlikely to occur in such a case.

The field of vision on May 24 showed a gap in the upper and outer quadrant, in addition to a defect extending to the 35° circle in the lower temporal quadrant.

The former defect, which corresponded to a shallow detachment below, had disappeared by July 5, while the latter defect, which corresponds with the large area which was attacked at operation, has remained constant.

Vision is only $\frac{6}{60}$ with correction, but this is as likely to be due to previous damage to the macular area by the detachment as to any ill-effect of the diathermic current. The man is able to help himself and to get about, instead of being quite blind, and is himself satisfied.

Discussion.—Dr. A. J. BALLANTYNE asked what was the original operation for the removal of the cataract; was it an anterior one, division followed by linear extraction, or solution by posterior division?

Mr. R. BEATSON HIRD said he wished to ask particularly about the ring scotoma. He had had two patients who complained of a dark ring previous to any changes in the fundus, and he thought this was a premonitory sign which must be recognized. It might occur a long time before the ophthalmoscope revealed anything.

Mr. GRAY CLEGG suggested that this patient's vision should be tested with telescopic glasses; he might to be able to read good-sized print.

Mr. MONTAGUE HINE (in reply) said that the original operations were performed forty years ago by Mr. Work Dod, who never did anything but repeated anterior needling.

He thanked Mr. Gray Clegg for his suggestion. There was a chance that the vision would further improve, as improvement in these cases often took place three or four months later.

He did not know how the green ring could be explained, but he was interested to hear that there were other cases in which it had been noted preceding detachment.

Quinine Amblyopia.—E. F. KING, F.R.C.S.

Mrs. R., on 9.11.34, took "nine pennyworth" of quinine (about two teaspoonfuls) to procure abortion. Three hours later there was a sudden onset of deafness, aphasia, and partial blindness. During the next four days the two former symptoms diminished but the blindness increased.

When first seen, 13.11.34, the pupils were inactive and no perception of light was present. The fundus appeared to be normal; the retinal vessels showed slight constriction only. By the following day central vision had returned, though no peripheral fields were demonstrable.

On 27.11.34, the pupils gave a brisk, though limited, response to light stimulation; the central vision in both eyes was $\frac{6}{12}$ and the peripheral fields extended to approximately 25° from fixation. The retinal vessels were more attenuated than at previous examinations. Pallor of the optic discs was not marked.

To-day (14.12.34) there is still some pallor of the discs, the vessels are a little contracted and the fields are very markedly restricted. The central vision is $\frac{6}{9}$ partly.

Discussion.—Dr. J. A. BALLANTYNE said that this case illustrated a point not sufficiently noted in present-day text-books, namely that at the stage when the loss of vision was most profound the fundus appearances were normal, and contraction of the retinal artery only made its appearance in a later stage, when recovery of vision was taking place.

Quinine amblyopia was said to be due to contraction of arteries, and when experimental animals were given massive doses of quinine they were supposed to have shown this contraction of arteries in the early stage. Seventeen years ago he had a case[1] which he saw within a few days of the taking of quinine, and the point referred to had been strikingly evident. When he first saw the patient the fundi were normal, and he concluded that the blindness might be a hysterical manifestation. However, he took the patient into hospital, and as time went on the arteries of the retina became more and more contracted, the final picture being one of very much contracted retinal arteries and a pale disc.

When he (the speaker) had been associated with Major H. E. Smith in Salonica, he made perhaps the earliest recorded observation on a case of quinine amblyopia. It was seen within one hour of the onset. There was profound loss of vision, with hyperæmia of the retinal vessels. Contraction of the arteries was not seen until four days later.

He concluded that the main cause of the blindness was the toxic action of the quinine on the rods, as the peripheral vision was more extensively damaged than the central; perhaps the rods were more susceptible to quinine than were the cones. The contraction of the vessels had not yet been satisfactorily explained.

Mr. EUGENE WOLFF said he had wondered whether, in quinine amblyopia, the toxin did not get to the retina by way of the vitreous. That would account for the effect on the vessels coming after that on the ganglion cells, and would explain the sequence of events—first blindness, then contraction of vessels.

[1] *Brit. Journ. of Ophthal.*, 1917, i, 153.

Mr. T. HARRISON BUTLER said that for four years he had been at the Ophthalmic Hospital in Jerusalem where malaria was endemic. To combat this the people took large doses of quinine. He saw occasional cases of deafness, but he did not remember a case of quinine amblyopia. It seemed as if there was some factor at work, other than quinine, by which a poisonous action was induced. It might, however, be a racial matter, as most of the patients at that hospital were non-Aryan.

Mr. KING (in reply) said that he had heard of three interesting cases that day. Three men had been treated for hydrocele by injection of quinine as a sclerosing agent. They were each referred to the ophthalmic department, as they were having attacks of mistiness of vision. In those three cases there were no permanent results.

Cyst of Iris.—J. D. MAGOR CARDELL, F.R.C.S.

I. W., a woman, aged 49. Cyst of left iris; two and half years' history. No injury. Healthy.

6.12.33, anterior wall ablated. 18.12.33: Vision $\frac{6}{9}$, with +1·25 D.C. The cyst has now recurred. Vision = $\frac{6}{18}$ with − 2·5 D.S.

When I first saw the patient the pupil was very much deformed, and had a crescentic appearance, the vision being very much reduced. I cut out a portion of the anterior wall; the cyst then collapsed, and vision became much improved (to $\frac{6}{9}$). Since that date, however, the cyst gradually re-formed, and before undertaking anything further operatively, I ask the view of members and invite recommendations.

I propose to perform iridectomy, through the whole thickness, because one can see through the cyst that the pigment of the iris forms its back wall.

The interest of this case lies in the fact that whereas many of the cysts seen are implantation cysts following trauma, there is no history of injury to guide one here.

Discussion.—Mr. T. HARRISON BUTLER said that he had had a case of cyst identical with that shown to-day, but in a different situation. Its genesis was very interesting: Eight years previously the patient, a woman, had had chronic glaucoma; he (the speaker) had trephined the eye, and the disc went into the anterior chamber. (In his book on the slit-lamp there was a picture of this, the disc sitting on the iris.) It remained there for eight years without causing trouble. Then one day the patient had come with a cyst exactly similar to that in Mr. Cardell's case. It had begun to cause a recrudescence of the glaucoma, and he (the speaker) carried out a similar operation, making an incision with the keratome. It had seemed simple to make an incision, put forceps in, and pull out the cyst, or a good deal of it, but he could not do so, and therefore he left it. The eye was much better for a time, though there was some reaction. He had to operate upon it again, as, though there was not a refilling of the cyst as before, there was a cystic formation present. He repeated the operation; the patient was treated with novarsenobillon, and the condition was now clearing up satisfactorily.

Mr. GRAY CLEGG said that cysts of the iris lay at different levels. In some cases transillumination did not enable one to see through the cyst, especially if the posterior layers were intact. In the present case there was clear translucency through the whole thickness, and for that reason he was in doubt as to whether the proposed operation would succeed.

Avulsion of Optic Nerve.—J. D. MAGOR CARDELL, F.R.C.S.

G. A., a girl, aged 14.

History.—September 20, 1927, knocked down by pedal cycle. Left eye very red immediately afterwards. 12.12.27 (first examination): Movements normal. Left diverging since operation. Scar centre of left eyebrow and middle of upper lid. White mass in vitreous projecting forwards 6 to 8 D, having indefinite edges with strands running from it in star formation. Three vessels appearing from behind the mass above were completely ensheathed, the uppermost one being totally obliterated, the lower two being recognizable later in their course of vein and artery. No view of

optic disc or macula. 15.10.28: Mass rather smaller, disclosing, behind its temporal edge, a white band of choroidal atrophy stretching between two affected vessels. 6.7.31: Further contraction of mass; sheathed vessels better seen. Fundus showed pigmentary changes round optic disc; some paresis of right superior rectus. 31.5.34: Vessels represented by white streaks. Vision: No perception of light.

The case is interesting because of the apparently slight amount of injury.

Many cases of avulsion after slight injury have been published. The late Mr. Basil Lang saw a number during the Great War, and Mr. Hine has published a series.

Discussion.—Mr. MONTAGUE HINE said that he remembered four such cases which occurred during the Great War. In one the injuries were gross; it was a case—as were the others—of gunshot wound through the orbit. He saw the patient three days after the injury had occurred; the patient had come down from the line. In one eye what could be seen looked like red paper, no fundus details being visible, and there was a round hole clean through, and a tiny speck of hæmorrhage at the bottom. This turned out to be the hole where the nerve had been pulled out, and it gradually became whiter and whiter. The man died of meningitis three weeks later, and sections were made.

As showing how important these cases might be, he would relate another. The patient, a carpenter, was sitting in a room which had a concrete floor, from which a metal rod was sticking up perpendicularly. On stooping down the man knocked his eye on this rod. He went to the West Sussex Hospital, and was found to have a torn conjunctiva; the fundus was normal. He (the speaker) saw the patient a month or six weeks later, as he could not see with the injured eye, but so little could be seen amiss with the eye that he began to suspect the honesty of the man's story. He obtained information from Dr. Ballantyne and Mr. Williamson-Noble, and wrote a guarded report, stating that there might have been bruising of the optic nerve from rotation of the eyeball owing to the blow with the metal rod; no one could say that the nerve could not have been damaged. Two months later he saw the man again, with Mr. Williamson-Noble, and there was then no doubt that the case was similar to one of avulsion, in which the optic nerve had been stretched and pulled. The disc was white, and the patient had no more than perception of movements, and $\frac{6}{60}$ vision.

Mr. BEATSON HIRD said that he had seen a number of these cases, some in a recent state, in which it seemed that a clean wound had been punched where the optic disc was. In some of the cases the retinal vessels were coiled outside the punched hole. The case seen this afternoon was of a rare kind. He had had a similar one in a boy who had been knocked over by a motor-car, and whose eye exhibited the late stages of avulsion of the optic nerve, though apparently there was no injury to the globe except the bruising after the accident. He had seen about twelve such cases during the Great War, but this was the first he had seen since.

Cyst of Sclera.—J. D. MAGOR CARDELL, F.R.C.S.

Y. B., aged 2. The cyst is swelling rapidly and has begun to encroach upon the cornea.

In this case there was no history of injury or operation. That, however, does not preclude the possibility of some minor injury, because, as we know, children who are being nursed may injure their eye against a pin or ornament worn on the mother's dress. Such an injury may escape attention at the time, especially if the child is crying. Some such accident might explain the condition in this case. The scars on the face are due to chicken-pox, from which the child has recently been suffering. The cyst has been enlarging rapidly, and last Monday it was encroaching on the cornea and was splitting its layers. I therefore tapped the cyst, and found that the contents were of the nature of aqueous—thin and clear. What I intend to do next is to cut off the anterior wall of the cyst. As there is no connexion between the cyst and the interior of the eye, the procedure should be fairly safe.

Discussion.—Mr. EUGENE WOLFF said that the implantation cysts of the conjunctiva usually dissected out well, except just at the point where the implantation occurred. A few years ago he had published[1] the account of a very large implantation cyst, and that cyst shelled out very easily, except where the injury—caused by a piece of coal—had occurred. If only the anterior wall was removed, the cyst would later re-form, as some of the epithelium would have been left behind.

Mr. GRAY CLEGG said it might be found that the conjunctiva was loose over the surface, in which case excision of the cyst might be possible. If not, it would be well at least to scrape the back surface, or even to cauterize it slightly.

Mr. CARDELL (in reply) said that the difficulty about cauterization was that, the cyst being so near the ciliary region, the ciliary body might be damaged by the procedure, and the eye might become useless. Mr. Wolff's suggestion was a good one, and he would endeavour to carry it out.

Spontaneous Orbital Hæmorrhage.—E. F. KING, F.R.C.S.

The patient complains of a sudden onset of diplopia and pain in her left eye. There is a small ecchymosis of the left lower lid and slight proptosis of the eye. In this eye, too, there is definite limitation of movement upwards and outwards. There are also petechial hæmorrhages in the left eye, and marked retinal sclerosis in both eyes. I think there has been a spontaneous orbital hæmorrhage behind the left eye.

Discussion.—The PRESIDENT said he had learned that this patient was subject to "dead fingers." A lady known to him suffered from dead fingers; occasionally she experienced in her hands or feet a feeling like the sting of a wasp, which was followed by a hæmorrhage, larger or smaller. He did not know why it happened. Probably something similar occurred in the orbit of the patient shown to-day. He was puzzled about the mechanics of the causation, because contraction of an artery should not cause hæmorrhage; it should, rather, decrease the supply of blood, as it did in dead fingers, and in the case cited the hæmorrhage was not associated with the dead fingers; it was separate both in time and situation.

Mr. KING (in reply) said that if a vessel contracted and the blood-flow became re-established later, hæmorrhage was likely to take place as a result of damage to the endothelium.

[1] *Proceedings*, 1928, xxii, 22 (Sect. Ophthal. 4).

Section of Dermatology

President—HENRY MACCORMAC, C.B.E., M.D.

[*November* 15, 1934]

Two Cases of Generalized Erythrodermia. — H. MACCORMAC, M.D. (President).

In both these cases the diagnosis of psoriasis was originally accepted, but the long duration and other features seem to call this diagnosis into question.

(I) C. W., a man, aged 34, developed what was said to be psoriasis in 1916, the eruption being present on elbows and knees. It spread slowly and three years ago became generalized. The condition has varied very little during two years' continued observation. From time to time small areas of white skin have appeared, as at present, on the face and feet, otherwise the whole skin has remained constantly red, with only very slight desquamation and, in places, slight infiltration. The histological picture is consistent with psoriasis, but is not characteristic of that disease. The blood-count on five occasions has shown an absolute increase in the white cells, amounting to an average of approximately 14,000 white cells per c.mm. The erythrodermia may thus be of the leukæmic type, and this alternative diagnosis seems to demand consideration.

(II) The patient, B. C. O'C., is a boy, aged 4½ years. An eruption was first noticed at the age of 5 months, on the wrists and backs of the knees, becoming generalized at the age of 8 months and remaining generalized from that time up to the present. The erythrodermia, which is pronounced and accompanied by thin flaking scales, has persisted unchanged for four years. There is ectropion, but at no time have any characteristic follicular papules been discovered. As in the first case, the histopathology is indeterminate. Nevertheless, in view of the prolonged course in this case, the age at which the eruption first developed, and the ectropion, it is considered that this may be an example of pityriasis rubra pilaris. Dr. Adamson has written that cases of pityriasis rubra pilaris have occurred in which at one period a generalized redness and scaling simulated pityriasis rubra.

The boy's mother was also considered to have had psoriasis. She now presents a number of lichenoid papules on the shoulders chiefly, and also follicular plugs on the elbows. There is marked hyperkeratosis of the palms and soles, which may be accounted for by previous arsenical treatment. Her eruption does not conform at any point with psoriasis; the alternative diagnosis of pityriasis rubra pilaris is just within the limits of possibility. At least, it is not psoriasis, which fact has a bearing on her son's condition in that it excludes a hereditary tendency to psoriasis.

Lichen Planus.—GODFREY BAMBER, M.D.

R. H., a girl, aged 9½.

History.—Little white spots were noticed on the upper eyelids about four years ago; these were gradually transformed into the present condition. The patches on the trunk were noticed only recently. The state of the tongue was not known until discovered on examination, and the patches on the lips have appeared since the patient first came under observation. Apart from a somewhat poor appetite, her general health is good.

Present condition.—The inner halves of both upper lids are pigmented, purplish, and slightly scaly, with several milia scattered over these areas. On the tongue are more or less circular, opaque white patches. There are ill-defined whitish patches on the lips and on the mucous membrane at the angles of the mouth. In the axillary areas the lesions are slightly raised, rough and pigmented, and their distribution tends to be linear. On the buttocks the lesions are round, pigmented and slightly atrophic.

The Wassermann reaction is negative.

Histological report.—Section taken from a lesion on the left posterior axillary fold. Epidermis: Some hyperkeratosis with widening of the granular layer. Cutis: There is some œdema of the papillary body, and there is a lymphocytic infiltration sharply demarcated from the lower part of the cutis.

Chronic Pyococcal Granulomatosis, resembling Gilchrist's Disease.—GODFREY BAMBER, M.D.

C. S., male, aged 51, occupation: painter.

History.—In April 1934 the patient had an attack of "influenza" accompanied by a slight rash on the left side of the face and nose. There was no other case of influenza in the house. He returned to work after a few weeks. In May the patient noticed a spot on the right side of his neck, which broke down into an ulcer. This healed quickly, leaving a scar. A few days later the patient noticed a blister on the outer side of the right knee. At this time he felt languid. Later, spots appeared in crops on other parts of the body. There was no history of injury to the skin or of contact with any infective skin lesion, although after his admission to hospital the family cat was found to have sores on the neck and was destroyed. The patient complained of slight itching.

Past illnesses.—1890: Urethral discharge and buboes; 1899-1900: In South Africa (his only time abroad) had rheumatism.

Admitted to hospital, 8.8.34, and found to have the following lesions:—

Face: Twelve lesions, including a nodule on the tip of the nose, and an ulcer on the lower lip involving the mucous membrane.

Neck: On the right side a pale, irregularly oval, slightly depressed scar, 2·5 cm. by 0·5 cm.

Right arm: Eleven ulcers, the largest 2·5 cm. in diameter. Left arm: Six ulcers.

Chest: Two small ulcers on the anterior surface. Buttocks: Eight ulcers.

Left leg: Five ulcers. Right leg: Four ulcers, the largest 9 cm. by 6 cm.

His general condition was good. There were no enlarged glands, and the spleen was not palpable. For the first week there was a moderate pyrexia (maximum 100·8° F.).

Pathological investigations.—Wassermann and Kahn reactions negative.

Blastomycetin (polyvalent strains): Intradermal test, no reaction.

Blood-count: R.B.C. 6,008,000; Hb. 104%; C.I. 0·87; W.B.C. 11,600; polys. (neut.) 85%; polys. (eos.) 1%; lymphos. 11%; large monos. 3%.

Tissue: Film shows large numbers of pus cells and some staphylococci. Culture gave growth of *Staphylococcus aureus*. No blastomyces seen.

Swab from lesion: Culture gave *Staphylococcus aureus*. No blastomyces seen.

Blood-culture: No growth after incubation for four days.

Fluid from blister on skin: no blastomyces; sputum: no blastomyces; urine: no blastomyces.

Histological report on excised lesion.—"Chronic inflammation of the skin. There is hyperkeratosis. In the corium there is an infiltration, largely perivascular, with lymphocytes, plasma cells, mononuclears and a few neutrophil and eosinophil

leucocytes. In connexion with a few of the areas of infiltration are a few ill-formed giant cells. No blastomyces seen."

Leishman-Donovan bodies not found.

The photographs illustrate the types of lesion seen on admission. On the face there were raised infiltrated nodules surrounded by a dusky zone of inflammation. The outer parts of the lesions were firm and comparatively avascular. The inner zones were depressed, the epidermis was lost, and the bases, in places crusted over, were covered with papillomatous proliferations. Some lesions were almost dry, others oozed pus from several points. On the limbs the ulcers were on the average larger in size, the blister element of the lesions more apparent, and there was less proliferation of the base of the ulcers. Clinically the case appeared to be one of a

blastomycotic infection, and I was puzzled by the repeated negative findings. In the *Archiv für Dermatologie und Syphilis*, 1934, 170 Band, p. 80, Willy Pick and Emil Löwi have described and illustrated a somewhat similar type of case followed up for five years, the causal organism being a staphylococcus, *Micrococcus pyogenes*.

They regard their case as a special type of vegetating pyodermia. In such conditions they have frequently found a raised blood-sugar, and in the case described a glucose tolerance test gave a blood-sugar curve outspokenly diabetic in type and in which sugar was not found in the urine.

Discussion.—Sir ALDO CASTELLANI agreed that this case was a very interesting one, and he thought, with the exhibitor, that it was not Gilchrist's disease, nor indeed any form of blastomycosis. In New Orleans, where he worked in winter, there were a large number of cases of pseudo-blastomycosis and similar conditions. In diagnosing, one must first consider the clinical symptoms. Usually in true blastomycosis there were large granulomatous nodules. If this case was of mycotic origin he would think of sporotrichosis. He had been wondering whether the patient had been given potassium iodide, and, if so, whether it had had any effect on the condition.

Dr. BAMBER (in reply) said that this patient had had large quantities of potassium iodide, also local antiseptic applications, and the case was now clearing. He did not think that the action of potassium iodide was in any way specific; it seemed to act on any granulomatous type of lesion.

Combination of Schamberg's Disease and Acrodermatitis Atrophicans.—W. N. GOLDSMITH, M.D.

M. R., female, aged 50.

Present condition.—On the volar aspect of each wrist is a circumscribed, dark brown patch, within the confines of which the veins are prominent and the skin is a little thinned and shiny. The colour is a dark reddish-brown, and at the periphery are quite distinct, minute cayenne-pepper dots.

Duration.—Twelve months.

The clinical appearances therefore present a combination of the features of Schamberg's disease and of acrodermatitis atrophicans. The distribution is very unusual for either.

Histology.—Microscopical examination reveals atrophy, especially of elastic tissue, and vascular inflammation, including actual extravasation of red blood-cells in small clusters. A section stained with Prussian blue showed the presence of hæmosiderin granules, a little deep to the blood extravasations.

This is a combination such as I have never seen previously. Dr. Gordon tells me that he has shown a case which was clinically similar, except that at the edges of the patches there were changes, which looked like those of morphœa, tough, hard masses. Nothing of that sort has been present in this case.

Discussion.—Dr. F. PARKES WEBER said that if these symmetrical atrophic patches had been situated about the ankles, they would perhaps have been regarded as Pick's erythromelie. The latter condition might be a variety of Herxheimer's acrodermatitis atrophicans, but there was a considerable difference in appearance. The speaker suggested, therefore, that the case shown was a rare example of Pick's erythromelie commencing on the wrists, the patches on which were sufficiently atrophic to be termed "parchment skin." With regard to the pigmentation in the case, he was not prepared to say what pigmentation was met with in typical cases of Pick's erythromelie as originally described. The pigmentation in the present case was doubtless due to deposit of hæmosiderin.

Dr. R. KLABER said he could not convince himself clinically that any atrophy was present in this case. He admitted the absence of elastic tissue in the upper part of the corium, but thought that the cellular infiltrate in Schamberg's disease was sufficient to account for the elastic tissue being crowded out.

Dr. GOLDSMITH (in reply) said he considered that the skin of the pigmented areas had an extra smoothness and was thinned. The veins in a normal person did not spring into prominence so abruptly. These prominent veins were exactly commensurate with the limits of the discoloured skin on both wrists. There was an abnormal absence of elastic tissue in the superficial layers of the skin, and therefore to that extent at any rate there was atrophy, and it was that kind of atrophy which was typical of acrodermatitis atrophicans.

Necrobiosis Lipoidica.—W. N. GOLDSMITH, M.D.

H. F. E., female, aged 33.

Condition in June 1934.—On the left shin are two similar patches, the larger being 3 cm. in its longest diameter. Whilst the smaller is slightly raised, the larger is depressed in the centre. The surface is shiny. The centres are yellow and traversed by fine, red capillaries; around these is a narrow purple border.

History.—Duration six years. Gradual extension without pain. Four years ago erythema nodosum on the left leg and arms following tonsillitis. Six years ago white-leg also on the same side, following confinement and pneumonia. She has had a rather troublesome cough. Father died of consumption.

Diagnosis.—I made a diagnosis of either the morphœa-like type of indurative tuberculosis or necrobiosis lipoidica.

Investigations (Dr. I. Muende).—Carbohydrate tolerance test normal, though the curve was a shade sluggish in getting down at the two-hour stage. Blood-cholesterol: 150 mgm. per cent.

Histology (Dr. I. Muende).—Flattening of epidermo-dermal junction. In the corium is marked œdema and dilatation and proliferation of the intima of the vessels. The collagen bundles are degenerated and fragmented. Scattered throughout the corium are zones of dense cellular infiltration, chiefly lymphocytes, with a few plasma cells and fibroblasts. Surrounding the foci the fibroblasts are more numerous, and here and there are a few giant cells of foreign-body type. Elastic tissue completely absent from necrotic zones, except in vessel walls. Sudan III preparation of frozen sections reveals reddish-brown extracellular globules in the necrosed zones and a brownish discoloration of the collagen. No intracellular lipoid. *Tuberculin* 1 : 10,000, strongly positive.

Comment.—This appears to be a case of necrobiosis lipoidica in a patient who shows no evidence of diabetes. There is a tuberculous background but its causal relationship is doubtful. The histology is quite different from that of my case of morphœa-like indurative tuberculosis, with which, however, it has a close clinical resemblance. This case, reported in the *British Journal of Dermatology*, 1929, xli, 226, has therefore been re-examined for lipoid changes, but none have been found.

Multiple Carcinomata.—W. N. GOLDSMITH, M.D.

R. R., female, aged 40.

History.—When first seen in November 1933 there were numerous lesions scattered over the body, covered by heavy crusts; some of them had spread peripherally, leaving central scars. Under the crusts were erosions and slight infiltration. She had had this trouble for eleven years and had been constantly taking bromide for epilepsy.

Wassermann reaction negative.

Biopsy (Dr. Muende).—Histology showed intra-epidermal carcinoma of Bowen type.

In addition to the larger, earlier lesions, which responded to X-rays, she has continued to develop innumerable little, psoriasiform lesions which are being destroyed with carbon dioxide snow.

Discussion.—The PRESIDENT asked if the patient had been given arsenic at any time, as so frequently happened in cases of multiple rodent ulcers associated with psoriasis.

Dr. GOLDSMITH replied that he did not know whether arsenic had ever been prescribed for this patient, but she was an epileptic, and he knew she had had bromide, with which a little arsenic was often combined.

Verrucose Pyodermia.—W. N. GOLDSMITH, M.D.

F. V., male, aged 46.

Present condition.—The whole of the dorsum of the left hand is occupied by a scar. Along its upper border there is an interrupted, serpiginous, raised, warty wall containing fistulous tracts through which pus escapes. The peripheral edge is bluish and smooth. On the dorsum of the right hand is a younger but similar lesion, circular in shape, the border of which is raised, blue and infiltrated, and the centre ulcerated and papillomatous. On the volar aspect of the left forearm and also on the inner side of the right arm are scars from boils.

History.—Nine months ago a splinter of Oregon pine "filthy and alive with creatures" entered the back of the left hand. A swelling developed, which discharged pus and gradually extended. Six months later a small abrasion from a chain occurred on the right hand, and was followed by a similar lesion. From time to time boils

have developed along the course of the lymphatic drainage up the arms. These may have been partly attributable to iodide, which he was taking.

Investigations.—Wassermann reaction negative. Tuberculin, 1 : 5,000, intracutaneous moderately positive. Sporotrichin, 1 : 30, intracutaneous negative. Blastomycetin, 1 : 10,000, severe necrotic reaction. Examination of smears revealed no blastomyces or other fungus.

Cultures from warty lesions: On Sabouraud, potato, glycerine agar, veal agar, grew only *Staphylococcus albus* and proteolytic bacillus, probably *B. proteus.*

Culture from abscess on the right arm grew *Streptococcus viridans.*

Intracutaneous staphylococcal vaccine 200 million to 1 c.c.: no reaction.

Mixed streptococcal vaccine 100 million to 1 c.c., produced an inflamed area 18 mm. in diameter.

Histology.—Papillomatous overgrowth of epidermis, abscess formation, and a granulation-tissue showing in some areas groups of small giant cells.

There has been considerable improvement since treatment with glycerine and Dettol dressings and small febrile reactions with milk and sulphur injections were instituted.

Comment.—Ferguson Smith, in his article on "A Form of Chronic Pyodermia" in the *British Journal of Dermatology*, 1929, xli, 149, comes to the conclusion that these cases are due to *Staphylococcus aureus* together with allergy. In this case no *Staphylococcus aureus* seems to be present, either in the young lesions or even in the boils. It is by no means certain that the streptococcus, if responsible for the abscess, was also responsible for the original papillomatous lesions, but it is of some interest that the staphylococcus gave no reaction to the intradermal test, whilst the streptococcus did.

I think these cases respond to systematic freezing with carbon dioxide, starting at the periphery and working inwards.

Addendum, 26.1.35.—The lesions have now all healed by this method.

Discussion.—Sir ALDO CASTELLANI said that in Louisiana and California mycoses were common, and, in such a case as this, one first thought of blastomycosis, and secondly of pseudo-mycosis of the blastomycotic type. In the present case there were some features which made one think it was true blastomycosis. The history was in favour of it, so was the slow progress, and the typical verrucoid appearance, with a clearing of the lesions in the centre, while there was a continual spread peripherally. He would not attach too much importance to the blastomycetin test, as he regarded it as a group test; it was positive in many different mycoses. Still, it was interesting that it gave a reaction in 1 : 10,000. Against the diagnosis of blastomycosis was the fact that the mycological examination had shown absence of fungus. His personal view coincided with Dr. Goldsmith's opinion that this was a case of pseudo-blastomycosis or dermatitis vegetans.

Dr. R. KLABER said that two years ago there was at St. Bartholomew's Hospital a case bearing some resemblance to this one, in which the condition was also on the back of the hand. In that case also there was a history of injury by wood. After observation for many months, during which time only negative or equivocal cultures were obtained, a micrococcus, the *B. actinomycetum comitans*, was grown in pure culture from the scarified growing edge. In consequence, a search in serial sections was undertaken, and eventually a minute focus of actinomyces was found. The lesion also spread centrifugally in this case, but there was not the same tendency to "wartiness." He suggested that a similar investigation might be worth undertaking in the present case.

The PRESIDENT said he had seen two cases almost identical with this, one of which he considered to be tuberculosis. That patient was a tuberculous subject who had cut his hand, and some of his tuberculous sputum had been rubbed into the wound. He thought that many different organisms could produce such a reaction as was seen here. This was not, therefore, a specific reaction.

Dr. GOLDSMITH (in reply) said he agreed with what the President had said. So far, it had not been found that these lesions had always been due to the same organism. He thought, nevertheless, that there was some clinical difference between tuberculosis verrucosa and these gross lesions which spread over large areas relatively rapidly, and often symmetrically. Histologically, also, they were different, as in tuberculous cases there was always considerable, fairly typical, tuberculous granulation tissue. But these cases showed a honeycomb appearance of the epidermis crowded with pus-cells, and only here and there on the outskirts, tiny groups of giant cells.

The speaker's other case, which was closely similar, was in a gardener, so he, too, was exposed to abrasions by wood. He was interested in Dr. Klaber's suggestion; he well remembered his investigations, but not the clinical appearance of his case.

Multiple Telangiectases (? Osler-Rendu-Weber Hereditary Telangiectasia).—J. E. M. WIGLEY, M.B., and GORDON HEGGS, M.D.

Male, aged 40.

History.—Suffered from mild nose-bleeding between the ages of 20 and 30. Has recently recovered from pneumonia. Noticed the present "red spots" appearing during the last three or four years. The ones on the lip bleed very easily and the bleeding is difficult to stop. He is not affected by cold and there is no suggestion of Raynaud phenomena.

Family history.—His mother suffered from nose-bleeding.

Present condition.—The patient was seen for the first time to-day, so there has not been time for complete investigation. He appears to be a well-developed healthy man. The spleen is not palpable. There are numerous small telangiectases on the malar prominences, nose, lips and buccal mucosa, backs of the hands and fingers, and under the nails. One raised lesion in the middle of the lower lip presents an ulcerated centre, with a clear-cut rolled edge. As it has only been present a few weeks, and has bled copiously, it is almost certainly of traumatic origin.

This case seems to belong to the same group as that which we showed before this Section in December 1933.[1]

Leiomyoma.—J. E. M. WIGLEY, M.B.

Female, aged 30.

History.—First noticed small lumps on the forehead and front part of the scalp about three years ago. These lumps are painful and tender, and are rendered much more so by exposure to cold.

Present condition.—On the left side of the forehead, spreading on to the scalp, and roughly along the distribution of the supra-orbital nerve, is an aggregation of raised papules, flesh-coloured, with an added pink tint. They are definitely tender, and feel as if they were subcutaneous.

Histological report (Dr. I. Muende).—In the van Gieson section the pars reticularis of the corium is seen to contain a circumscribed tumour comprised of interlacing bundles of plain muscle tissue, between which there are narrow strands of fibrous tissue. The muscle fibres show evidence of hydropic degeneration.

Diagnosis.—Leiomyoma cutis.

Pemphigus.—L. FORMAN, M.D.

L. G., male, aged 33.

Five years' history of vesicles and blisters on the arms and buttocks with generalized itching.

Has had five severe relapses, the last in September 1933 when he was first seen. There was then a generalized eruption of blisters, particularly in the groin, armpits, and buttocks, and around the anal region. The mouth has always remained free.

[1] 1933, xxvii, 716 (Sect. Derm., 34).

The condition cleared in hospital. Treatment included sodium antimony tartrate gr. ½ each day for ten days, and hypertonic saline intravenously.

The blood-count in the relapse showed a white-cell count of 18,400 per c.mm. and a normal differential count.

The patient now shows recurring erythematous areas on the elbows and buttocks, with the formation of bullæ and grouped vesicles. Sitting down for any length of time will cause blisters on the buttocks. Friction with the finger could not produce blistering.

Dercum's Disease.—A. D. K. PETERS, B.M. (for Dr. H. D. HALDIN-DAVIS).

E. F., aged 44, a well-built married woman, of average height and obesity.

There are present diffuse subcutaneous masses on the posterior aspect of the upper parts of the arms, also definitely demarcated nodules on the anterior aspect of the forearms, buttocks, and extensor aspects of the thighs. The lesions tend to be placed symmetrically, and the nodules vary in size from that of a marble to that of a plum. Most of them are attached to the skin, some are tender. The skin over them appears to be cooler than that of the surrounding parts.

The lesions have been present for seven years. They are becoming more numerous and are increasing in size. They become more prominent, bluish in colour and painful in cold weather and on local chilling.

General examination.—No constriction of fields of vision. Fundus oculi normal. Blood-pressure 158/105. Varicose ulceration of leg. Thyroid small. Pulse 72; temperature 98·6°. Urine: sp. grav. 1012.

The patient complains of shooting pains "like electricity" in her back and arms. She states that she is losing weight and has no appetite at times. She is not as strong muscularly as she used to be. She worries over details, always feels depressed, as if she had been crying, which she does without cause sometimes. She sleeps badly. There is no excessive thirst or polyuria.

There are occasional headaches "behind the eyes" which are generally present for two or three days before the menstrual period. Eyesight is normal. There is no breathlessness or palpitation. There is a tendency to easy bruising. The patient's hands and feet have gone blue with cold for the last two years.

Menstrual history $\frac{3}{28}$, regular; small loss. Lately $\frac{3}{6}$ for one and a half years. Hot flushes for two years.

Past history.—Gastric ulceration and hæmorrhage twelve years ago.

Family history.—Six children.

Investigations.—Section of nodule (Dr. D. M. Vaux). Mass of lipomatous tissue.

Skiagram of skull: (Dr. V. Williams.) Pituitary fossa normal.

Glucose tolerance test (Dr. Pillman-Williams): Curve within normal limits—

Time	Resting	¼ hour	½ hour	¾ hour	1½ hours	2 hours	2½ hours
Sugar % in glucose	0·09	0·15	0·18	0·16	0·13	0·12	0·1

Treatment.—On the advice of Dr. C. B. Heald the patient is having a course of vapour baths. After two treatments she states that she feels less depressed, and that the nodules are smaller, as they are in hot weather.

Commentary.—This case exhibits both the encapsulated and infiltrated type of lesions found in adiposis dolorosa, but the patient is not generally obese.

When Dercum originally described the disease in 1888, he considered it to be due to a disorder of the thyroid gland, but later his investigations showed changes in the pars anterior of the pituitary. It may be presumed that depressed activity

of the latter tends to diminished production of the thyroidotropic and gonadotropic hormones. There is some slight evidence of a pluriglandular syndrome in this case, an interesting point being that those symptoms of thyroid and ovarian involvement such as coldness of the hands and feet, diminished menstrual flow, and hot flushes, have only been present for two years, while the lipomata have been present for seven years. There seems to have been a long latent period between the direct effects of the pituitary dysfunction and its indirect effects exerted through other endocrine glands.

I should like to thank Dr. Haldin-Davis for allowing me to show the case.

Dr. F. PARKES WEBER said he did not regard this as a case of Dercum's disease; his diagnosis was multiple subcutaneous lipomata. These multiple lipomata could be met with also in people who were not particularly stout, and in men. He did not lay stress on the presence of a certain degree of pain, as that was not unusual in the condition in question. This woman was now approaching the menopause, and she was likely to have fibrositic pains. He suggested she should be induced to give up her daily beer.

Multiple Endotheliomata.—ROBERT KLABER, M.D.

This patient, a woman aged 38, enjoys good general health. There is no family history of any similar condition.

Three months ago, at the angle of the right lower jaw, there appeared a smooth, pink, raised, infiltrated, oval plaque, now 1 in. by ½ in. A month ago a similar, but larger, plaque appeared on the right temple. It is now 2½ in. by 2 in. It is harder and lobulated, with overlying telangiectasis. It may be moved over the underlying bone.

Other smaller plaques are present on the left side of the neck and behind the left ear, also on the right side of the neck and in front of the left ear. The plaques on the neck appear to consist of an aggregate of small pink nodules of pinhead size.

There are no palpable lymph-glands. Neither the spleen nor liver is palpable. There is no evidence of any primary growth elsewhere.

The Wassermann and Sigma reactions are negative.

A blood-count showed total leucocytes 11,600 per cubic millimetre.

Differential count: Polys. 8,700; lymphos. 2,320; large monos. 232; basos. 232; eosinos. 116.

A piece was removed for biopsy from the lesion behind the left ear. The section shows a normal epithelium and upper half of corium. Below this level, however, there is a dense, cellular mass. These cells are irregularly arranged, though with a tendency, seen in a few areas, to be grouped round small vessels. The cells show some variation in structure and staining reaction, but for the most part consist of large, undifferentiated cells, with a marked tendency to vacuolation. In the deepest part of the section are present a few much larger vacuoles, which may have arisen by confluence of several smaller ones, but more probably represent remnants of infiltrated fatty tissue.

Opinion.—One is reluctant to make a diagnosis of endothelioma when the existence of skin tumours of this nature is no longer generally admitted. I believe most of the older cases described under this title are now generally regarded as having been basal-celled tumours of the types now known as "cylindroma" or as "epithelioma adenoides cysticum." This case, however, clearly does not belong to this group. In view of the characteristic arrangement, vacuolation and other appearances of these cells, Professor E. H. Kettle has expressed the opinion that the tumour is probably of vascular origin.

I have therefore ventured to employ the old term of "multiple endotheliomata." Some might prefer the description of "angiosarcoma" but in any case I think, in

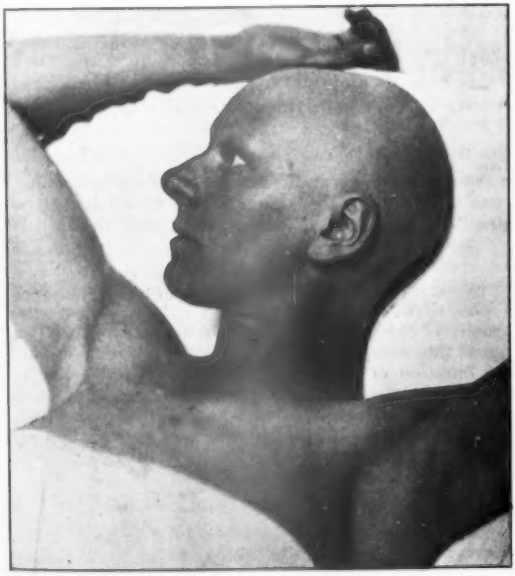
view of the rarity of locally malignant tumours of this type, that it is of some importance to separate them, where this seems reasonable, from the larger group of undifferentiated sarcomata.

Dr. J. E. M. WIGLEY said that he had shown a case of multiple endotheliomata, of the scalp and face regions, about two years ago. The diagnosis, which was supported by Dr. J. M. H. MacLeod, was generally accepted. Clinically the tumours appeared to be exactly the same as in this case, but it would require further study of the sections to decide whether the histology was identical. The lesions in his case had proved completely radio-resistant, and all that could be done was to excise the tumours as they became inconvenient to the patient.

Alopecia totalis supervening on Hirsutism.—ALISON N. MACBETH, M.B., B.S.

M. P., aged 28, a widow, came to the Out-Patient Department of the South London Hospital, January 1934, complaining of baldness. She was seen by Dr. Elizabeth Hunt and Miss Margaret Basden, F.R.C.S., to whom I am indebted for permission to carry out investigations. Dr. Levy Simpson kindly saw the case in consultation.

History.—The patient, who has always been healthy and energetic, states that when 12 years old she had such an exceptionally strong growth of hair on the arms



and legs, that she would not bathe in public. Menstruation began at the age of 14½; periodicity $\frac{5}{21}$, soon changing to a regular $\frac{5}{24}$, maintained up to the time of treatment. At 16 years of age she noticed some hair on her face, about which she was extremely sensitive.

At the time of her marriage at the age of 23, she was still very hairy. Her weight was then 8 stone 9 oz. and has hardly varied since. She has had two healthy children, at the ages of 23 and 25 years respectively, menstruating at regular

intervals throughout the greater part of the first and the whole of the second pregnancy, the periods reappearing one month after delivery in each instance, despite six months' lactation on the first occasion.

Loss of hair began at the age of 25, during severe vomiting early in her second pregnancy. The loss was first noticed by a hairdresser as a bald patch on the parting, and before her delivery several more bald patches appeared. This was still associated with a general appearance of virilism. One month after delivery her young husband was killed in a street accident, leaving her in straitened circumstances. Lactation diminished abruptly and nursing was abandoned two weeks later (four months after delivery). Three months after this emotional stimulus, the alopecia became generalized and complete, in the course of a single fortnight—involving the face, extremities, trunk, flexures, and genitalia.

Family history.—The mother is said to have had a pronouncedly abnormal growth of hair on the face since the age of 35. Her axillary hair is said to be scanty, that on the legs unnoticeable.

On examination (10.1.34).—Complete alopecia, involving the scalp, eyebrows, eyelashes, axillæ, pubes and legs. An occasional sparse greyish-white hair remained on the pubes. The uterus was small, the clitoris very well but not abnormally developed.

Treatment by intramuscular injection of large doses of dimenformon (dihydroxy-œstrin benzoate) was attempted. A markedly increased patchy growth of white hair was apparent on the scalp at the end of one week, but subsequent results were disappointing.

Several investigators (Gans, Urbach, Pulay, Wiedmann, Hoecker) have reported more favourable results in the treatment of alopecia by œstrogenic hormones. Stimulation of hair-growth is also recorded under experimental conditions (Kun and Borchardt, Janson).

Dr. F. PARKES WEBER said that in these cases of generalized alopecia, the usual course of progress, under various treatments, was a "flickering one" like a candle flickering before finally going out. Before the final extinction, the growth of hair occasionally "flared up" again, as if nothing had happened.

Dr. A. D. K. PETERS said that in treating cases of hirsuties she had found that while administration of œstrin at first caused some slight but definite loss of hair in most cases, its prolonged use had led to an increased growth of hair. There were some indications that the different results obtained depended upon the dosage, the time of administration in the menstrual cycle and possibly upon the duration of treatment. Dr. Haldin-Davis had a patient with alopecia totalis whose hair and eyelashes grew when she became pregnant, only to be lost again three weeks after parturition. Her œstrin output had been shown to be abnormally low. She was being treated with large doses of œstrin and was growing lanugo hairs.

United Services Section

President—Major-General P. H. HENDERSON, C.B., D.S.O.

[*December* 10, 1934]

The Choice of an Anæsthetic under Conditions of Active Service.

By Squadron-Leader E. D. D. DICKSON, F.R.C.S.Ed., R.A.F.M.S.

IN determining the attributes of the ideal war-emergency anæsthetic, we must first consider the principal circumstances requiring the use of anæsthesia in war. We have the minor missile casualty requiring, say, five minutes' anæsthesia—as in opening and cleaning a bullet track, or reducing a simple dislocation or fracture—the more severe casualty where some trimming of bone and ligature of vessels is required, and the full dress surgical operation of emergency where twenty minutes or so of anæsthesia is necessary. In all such cases the desiderata are very much the same and are as follows:—

(1) Safety. The anæsthetic must be so safe with regard to immediate and remote effects that it can be used in any case, regardless of age, condition, or degree of shock, without serious risk of complication.

(2) Portability, involving light weight and no high degree of fragility.

(3) It should be easily and quickly administered by the surgeon himself if no anæsthetist is available.

(4) Rapidity of action with quiet induction. In the cases we are considering it is of the utmost importance—in order that the limited medical personnel can deal with as many cases as possible—that the time spent on each shall be reduced to a minimum.

(5) No complicated apparatus should be necessary.

(6) Controllability of period of anæsthesia. This is desirable on the ground that patients should not spend more time than is necessary in a state of unconsciousness after treatment.

(7) The addition of other anæsthetics should not be necessary.

(8) Absence of extrinsic risk, such as that of fire when using ether, of fragmentation by a bursting shell, or damage as of an ordinary gas cylinder from the impact of a bullet.

(9) There should be no contra-indications to its use.

(10) There should be no serious after-effects. Recovery must be complete so that late untoward symptoms are not masked.

(11) It should not be volatile and should not affect the operator.

(12) Certainty of action.

(13) Stability in storage.

The anæsthetics in common use may now be compared with the ideal anæsthetic.

(I) *Gas-and-oxygen.*—For safety, rapidity of induction and certainty of action, gas-and-oxygen anæsthesia takes a high place, its contra-indications are almost nil, but for use on active service it has several serious disadvantages. A number of heavy cylinders are required so that the apparatus is not easily portable, while various

mechanical defects may occur, especially in hot countries, where rubber tubes are apt to perish quickly and without warning. It is absolutely necessary to have a skilful anæsthetist to administer gas-and-oxygen, as the technique is not simple and careful attention is required throughout the administration, while the difficulty of obtaining supplies in remote areas and the inherent cost are further disadvantages. These criteria apply also to such other gaseous anæsthetics as cyclo-propane and ethylene, which, in addition, are extremely inflammable.

(II) *Ether.*—Like gas-and-oxygen, ether is safe and certain in action, but induction takes a long time and, in fact, may be impossible without the aid of some additional anæsthetic, such as ethyl-chloride or chloroform. Ether also requires the continuous attention of an anæsthetist, although perhaps a trained medical man is not quite so necessary as with gas-and-oxygen. Ether is extremely volatile and highly inflammable, which makes its administration dangerous and difficult, especially in tropical countries. An atmosphere saturated with ether is very unpleasant for the operator. The after-effects of ether, although not usually serious, are often very unpleasant, vomiting and coughing being particularly troublesome. The journey through a cold atmosphere, say from a casualty clearing-station to a hospital further down the line, shortly after anæsthesia with ether might result in serious pulmonary complications. Although the necessary material is not particularly bulky, great care must be taken in its transport, as the danger of explosion is considerable in case of accident.

(III) *Chloroform.*—Induction is fairly easy with chloroform and little of the drug is required. It is perhaps the most certain in action of all the anæsthetics and probably, for that reason, the most dangerous. In emergency it can be given by an untrained man, provided he knows the danger of the drug. It is much less volatile than ether and is, therefore, safer and easier to use in the tropics. It is non-inflammable, and the atmosphere in an operating theatre where chloroform is being used is not quite so trying to the surgeon as when ether is the anæsthetic. The great disadvantage in the use of chloroform is the liability to sudden heart-failure. This is of particular importance, as this complication is most likely to happen with young adults. There are several contra-indications to the use of chloroform anæsthesia, of which those most likely to be met with on active service are septicæmia and toxæmia.

(IV) *Local and spinal anæsthesia.*—These forms of anæsthesia within their limits are satisfactory. The surgeon gives the anæsthetic himself. Induction is fairly quick and the action is certain. The anæsthetic, *per se*, is safe, and after-effects are not serious, but local and spinal anæsthesia have their obvious limitations. Apart altogether from the patient's own desires, for many emergency operations the surgeon prefers to have the patient unconscious. Again, it is not worth while inducing spinal anæsthesia for short operations, while for such procedures as cleaning wounds, extracting pieces of shell, etc., whenever contamination of the wound must be presumed, local anæsthesia is not entirely satisfactory.

(V) *Avertin.*—This is not considered in this discussion as it entails the careful preparation of the patient, dosage, etc.

(VI) *Evipan sodium.*—The attributes of this drug, which is the freely soluble salt of N-methyl C-C-cyclo-hexenyl-methyl-barbituric acid, will be considered point by point against those of the ideal anæsthetic already discussed.

(1) Evipan is thought to be as safe as ether and safer than chloroform.

(2) Evipan is perhaps the most portable of all anæsthetics. One box containing enough of the anæsthetic for five operations weighs only a little more than a quarter

of a pound. As evipan sodium is put up in separate ampoules, it is unlikely that all the material would be wasted if an accident happened in transit.

(3) Evipan can be given by the surgeon himself. If an airway is inserted, an attendant to look after the patient is not essential.

(4) Induction with evipan is rapid and quiet.

(5) The only apparatus needed for the administration of evipan is a 10-c.c. syringe and needle.

(6) The duration of anæsthesia is not altogether controllable with evipan. Some patients seem to require a larger dose than others in order to produce the same degree of anæsthesia, but experience in the use of the drug is of great value in determining the amount necessary to produce a certain length of anæsthesia in a given individual.

(7) For operations lasting not longer than 20 or 30 minutes an additional anæsthetic is required after the effect of the original injection has worn off. Either another injection of evipan can be given or ether administered. Premedication with scopolamine-omnopon will prolong the period of anæsthesia.

(8) It is non-inflammable.

(9) The only contra-indication is severe liver disease, a condition unlikely to be met with on active service. Some conditions, such as septicæmia or toxæmia, demand special care in avoidance of overdosage, but this applies to all anæsthetics.

(10) No serious after-effects are likely.

(11) It is non-volatile. It does not affect the anæsthetist.

(12) Evipan is not absolutely certain in action, but provided that enough is injected, it is bound to be effective.

(13) It is stable, even in tropical storage.

It can be seen from the foregoing that evipan sodium fails in four particulars to attain the standard of the ideal anæsthetic. Undoubtedly its most serious disadvantage is that for operations lasting longer than 20 or 30 minutes another anæsthetic is necessary, and this requires the attendance of an anæsthetist as well as a surgeon.

The majority of emergency operations on active service, however, can be completed in under half an hour, and if the patient should begin to come round before the end of the operation, the surgeon himself can give a second dose of evipan to produce a further period of unconsciousness. If an anæsthetist or trained assistant is present, anæsthesia can also be prolonged without difficulty by the administration of small quantities of ether. Another objection to evipan is its lack of certainty in action. This is true if a standard scheme of dosage is used, but in resistant cases an increase in the rate of injection will certainly produce anæsthesia, even though a large quantity of the drug may be necessary. Experience in the administration of evipan makes it easier for the operator to pick out beforehand the type of patient who may prove difficult.

As far as contra-indications to the use of evipan are concerned, there are certain serious conditions which make the administration of any anæsthetic a risk. Cases of severe shock, septicæmia or cachexia are all bad surgical risks, and great care must be taken with evipan, as with any other anæsthetic. The only absolute contra-indication to evipan is severe liver disease, and such a condition is not likely to be met with on active service.

Although the duration of anæsthesia with evipan is not closely controllable, workers with experience of this drug are usually able to estimate the dose required for any operation after a brief examination of the patient. If a quantity of 40 or 50 c.c. of the 10% solution is made up in a sterile flask, the operator has a supply of the solution at hand, and a second injection can always be made at a moment's

notice. Even if a second injection is necessary, it means far less trouble than the constant attendance of an anæsthetist maintaining unconsciousness with one of the inhalation narcotics.

I have attempted to show that of all anæsthetics at present known evipan sodium is the most suited for the emergency use of active service.

[A film showing the exact technique of the administration of this drug was shown by Dr. Jarman.]

New Methods of Evacuation of Wounded.—By Colonel E. M. COWELL, D.S.O., M.D., F.R.C.S., A.M.S. (T.A.).

A practical demonstration was given, accompanied by a film, showing the Universal Stretcher Sheet, which can be readily fitted to a loaded or unloaded stretcher, to enable the patient to be carried in any required position, in perfect comfort and security.

The Universal Stretcher Carrier and Tilter was also demonstrated. It has several novel features. It is mounted on wheels, and on it the stretcher can be carried at various angles, e.g. to give a Fowler's position. It can also be tilted to and fro, thus providing Eve's postural artificial respiration. When locked it makes a dressing or operating table. The carrier is so jointed that it folds up for transport, and weighs less than forty pounds.

[Note: A full description of the stretcher sheet, with drawings and photographs, has been published in the "Revue Internationale de la Croix-Rouge," 1934, 16^{me} Année, No. 187, pp. 554-560.]

Section of the History of Medicine

President—Sir StClair Thomson, M.D.

[*November* 7, 1934]

G. B. Morgagni and the Anatomico-pathological Conception of the Clinic

[Abstract]

By Professor Arturo Castiglioni (Padua)

Among the anatomists of the eighteenth century the Italians maintain a high place. Giovan Battista Bianchi (1681-1761) brought a remarkable contribution to the anatomy of the liver, of the lachrymal ducts and of the genital organs. Giovan Battista Santorini (1691-1736) with his exact anatomical observations published in 1734, must be considered as the forerunner of Morgagni. His studies and observations were dedicated chiefly to the muscles of the face, larynx, and penis. His anatomical illustrations, published in 1765 with Girard's comments, are considered by Daremberg as one of the masterpieces of the eighteenth century.

Normal anatomy and pathological anatomy which had already had famous exponents in Italy—such as Malpighi and Valsalva—found in Giovan Battista Morgagni the innovator of genius. He was not only one of the most fruitful of observers, not only a profound and tireless speculator, but also a master alike of style and method. The precision of his writings is equalled by the exemplary honesty with which he spent his whole life in study before publishing the huge work which was to immortalize his name. He remained faithful only to those statements which he could prove, and in an age when speculation ran riot he kept free from extravagant ideas.

Giovan Battista Morgagni (1682-1771), born at Forli, showed from his childhood a wonderful aptitude for study. When only fourteen he composed speeches and poems, and commented on philosophical texts in public. In 1698 he went to Bologna, where he became a diligent pupil of Valsalva. He took his degree in 1701, and in 1706 he published his first work, *Adversaria Anatomica Prima*, containing valuable observations on the anatomical structure of the larynx. In 1707 he was appointed reader and "preparator" in the anatomical theatre of Bologna. In 1711 he obtained the chair of Theoretical Medicine in Padua. In 1715 he succeeded to the chair of anatomy, and soon his lectures became so famous that a host of Italian and foreign students flocked to attend them. During this period he published the second part of *Adversaria Anatomica Prima*, in which he dealt more particularly with the anatomy of adipose tissues, of the muscular system of the œsophagus and of the intestines, of the biliary apparatus, and of the structure of the lungs. This was followed by a series of anatomical *Epistles* by which he earned the esteem of the most famous Italian and foreign physicians, for example, Boerhaave, Winslow, and Ruysch, who regarded him as their Master. The last of his works was: *De sedibus et causis morborum per anatomen indagatis*, which he published in 1761. In this he collected the valuable results of experiments in the field of pathological anatomy.

It was not only in medical science that the learning and the productive activity of Morgagni made itself apparent. He was also a great classical scholar and wrote with great competence on the works of Celsus. As an archæologist he dealt in his *Lettere Emiliane* with the ancient monuments of Forlì and its surroundings. To him, too, we owe the biography of Guglielmini and that of Valsalva.

Morgagni was a tall man. His bearing was noble and very courteous. He affected frugal fare and simple dress. He lived in perfect health of body and mind till the last days of his life, a watchful witness of the scientific movement in all the fields of culture.

In his first lecture in Padua *Nova institutionum medicarum idea*, he affirmed clearly the programme of his teaching. At that time the University in Padua was in decadence, and its subsequent resurrection is mainly the work of Morgagni. There were many initial difficulties. Morgagni himself complains often of the scarcity of anatomical material. In the year 1719 in a letter to a friend, he tells that he was compelled solemnly to begin his lectures without a subject for dissections, and that sometimes he had to be satisfied with a skeleton. Nevertheless, Morgagni, despite many offers, would not leave Padua. He could not admit of limits and restrictions to the liberty of scientific work, and he knew perfectly that he could not enjoy in any other university the liberty which Padua enjoyed.

Thus Morgagni's life passed, devoted always to teaching, his mind always lucid, his criticism always severe. In 1770, when almost 90 years old, in a most trying winter, and although the great halls of the University had no stoves, he held regularly the whole course of anatomy. For sixty years he hardly ever missed a lecture.

The studies of Morgagni began in the field of normal human anatomy. Twenty-four years old, when he published the first volume of his *Adversaria Anatomica*, he yet reveals himself a master. He shows immediately that anatomical inquiry must be associated with physiological, and he indicates that without experiments no secure conclusions can be reached. He associates the study of the texts with the examination of the body, not neglecting to learn all that has been done before him.

The book on which the fame of Morgagni is essentially founded, *De sedibus et causis morborum per anatomen indagatis* ("On the seats and causes of diseases explored by the anatomist"), published when he was almost 80, is the work of a man who, in his serene old age, collects the sum of his experience and lays it before a young friend in the form of letters. One must bear in mind this unusual origin of the book in order to explain its form, its style, and its success. It is not that of a scientist who wishes to demonstrate the truth of his discoveries or the importance of his studies, but that of an experienced and impartial old man, who, having reached the end of his active life, desires to confide his intellectual heritage to a young friend, who had asked him insistently and repeatedly to collect and publish the fruits of his observations and of his studies. The book, written in the form of letters, plainly shows its origin. All rigid system which forces the author to order his arguments on a fixed programme is quite lacking. Conclusions and judgments of a general character are omitted or spread here and there, without pretending to constitute the foundation of the work. In the preface the author writes that, following the advice of his friend, he wants to correspond with him familiarly, mingling the various themes that they had discussed together. And so these remarkable letters follow one another rapidly, addressed, as Morgagni declares, neither to the very erudite nor to beginners.

The book collects, in the first place, numerous observations which are contained in the *Sepulchretum* of Bonet, first published in 1679, and amplified by Manget in 1700. This was the first text containing a well-ordered series of anatomico-pathological observations. To these are added the observations of Valsalva, his illustrious teacher, for whom Morgagni always felt a deep gratitude, expressed in a

biography in which he reveals not only the merits of a great master, but also the sentiments of a pupil who feels a lasting attachment for him. Finally—and this is the most exact and complete part of the book—Morgagni wrote his personal observations, in which the description of clinical symptoms and anatomical findings are abundant and precise.

The introductory remarks contained in the dedication of the first volume to the "Academy of the Curious of Nature," which had elected Morgagni as member, shows that the physician who proceeds to the anatomico-pathological examination needs a perfect knowledge of normal anatomy. To-day it appears superfluous, but at the time the distinction between normal and pathological anatomy was still very indefinite, for one can often find accounts of some perfectly uninteresting autopsies by the side of descriptions of important pathological phenomena. Morgagni demonstrated that the knowledge of normal anatomy is indispensable for the clinician; and this was one of his greatest merits. Then with a sure hand he drew the picture of the pathological alterations, and distinguished them from post-mortem phenomena which had hitherto been judged erroneously.

In his classical writings we find brought out for the first time the close relationship between clinical phenomena and anatomico-pathological facts. Morgagni is the first to base medicine on pathology, a relationship which the followers of the Hippocratic school had already dimly perceived without penetrating the essence of its mysteries. Before him anatomical pathology did not exist as a science.

It would be a mistake to think that before Morgagni no physicians had reasoned in an anatomico-pathological way. Malpighi, Valsalva, and the famous Swiss, Teophilus Bonet (1620-1689) had prepared the way. In works of other forerunners, Harvey among them, are to be found important contributions to pathological anatomy. But Morgagni is the first to sift the enormous material, to collect with an exact critical sense the most important observations, analysing them minutely and reconstructing the link between pathological and clinical phenomena, between the diseased organ and the manifestations of the disease, which often leads to the discovery of the cause. It was Morgagni who studied and pointed out the anatomical differences between the normal and the diseased organ, and who demonstrated, with frequent references to clinical observations, and trusting exclusively to his personal experience, that an alteration of function must needs correspond to every anatomical alteration of the organs. And so Morgagni is really a master in the clinical field, as well as the founder of pathology.

If we analyse the work of the famous Paduan anatomist in its details we shall see first of all that a fundamental principle, to which the author himself alludes in the preface to his work, is laid down. He teaches that autopsies cannot be useful unless they are performed by an expert clinician well acquainted with normal anatomy, and unless accompanied by the careful study of the history of the disease. Morgagni's pathological anatomy differs essentially from that of his predecessors, such as Bonet and others, because it is based on a perfectly logical system of reasoning, no longer attached to a single observation but forming an essential part of medical speculations.

The anatomico-pathologist with his researches must cast light upon the history of nature by means of objective observations. Thus Morgagni returns to the Hippocratic tradition.

It is in the search for causes, the obscure part of Hippocratic medical studies, that he continues the method: as if a painter were to paint in with a firm brush the details and the outline of the great figures left unfinished by his great master, thus giving light to the whole picture and making its meaning clear. It is thanks to the picture that Morgagni gives us that we get a complete and exact conception of the clinical picture. In this he is perfectly and eminently Italian—Italian in his mathematical clearness of reasoning, and in the power (greater in him than in any

other) of fusing ideas and knowledge, which attain through different channels a precise and analytical, as well as synthetical and definite result. To these qualities he joins a profound and wide knowledge, together with an exemplary modesty which prevents him from publishing his works until the very end of his active life. This great publication was due to the insistence of a young physician to whom he wanted to reveal the whole of his experience, while at the same time he declared that he thought his work should only be considered as a continuation of Teophilus Bonet's.

After what we have said it will be realized how difficult it is to know what discoveries we really owe to Morgagni, and for which of them it is opportune or necessary to claim his priority. We must content ourselves with pointing to the masterly pages in which he describes the anatomical phenomena which accompany angina pectoris and the degeneration of the myocardium; the observations on the fibrinous clots which are found in the heart after death, and which had hitherto been regarded as pathological effects; the observations on tuberculosis of the lungs; the description of the process of fusion of tuberculous foci in the lungs, a description which might even to-day be taken as an example for its clearness and vivid plasticity; the studies on the tumours of the pylorus; observations on blenorrhœa; statements on the essential difference between blenorrhœa and the ulcers of the urethra which were supposed to spring from it. These are among his most notable contributions to medicine. Morgagni is the first to declare that apoplexy is not caused by a lesion of the cerebral matter, but by an alteration in the blood-vessels; the first to discover the cause of sclerosis in the cerebral arteries; the first to note that while hemiplegia appears on the opposite side from the affected cerebral hemisphere, this is not the case with hemiplegia of cerebellar origin. He may indeed be said to have excelled in every branch of pathological anatomy, and at a distance of almost two centuries, his work appears so thoroughly alive, so complete, that the objections raised against him and the attacks made on him by Broussais make us smile. It is the highest praise of his work to say that when we read his pages we can make exact diagnoses with the help of our modern knowledge, even in those cases in which his own conclusions are uncertain.

Section of Neurology

President—S. A. KINNIER WILSON, M.D.

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Cortical Cerebellar Degeneration

By Professor J. LHERMITTE (Paris)

AMONGST the aged who are suffering from disturbances of standing and walking, we meet some who present a particular type. I have in my mind those who are unable to stand and walk correctly although capable of performing any movement with their lower limbs in a recumbent position.

The cause of this is still open to discussion. As a matter of fact, it is impossible to put all these troubles into the same category because their nature and evolution differ greatly.

During the last twenty years, some observations have been recorded which demonstrate that a definite type of astasia-abasia exists, in which we can discover the characteristics of a progressive deterioration of the cerebellum.

If we consider the relatively small number of observations recorded in literature, we might think that this syndrome is very rare; as a matter of fact, it is not so rare as it seems. Personally, during the last decade, I have had the opportunity of observing three typical cases and, in one of them, the necropsy and histological study verified the diagnosis made during life.

This disease is worth studying, not only because we are now able to recognize quite easily such a clear-cut clinical syndrome, but also because we can appreciate accurately the pathological process and find in it a new example of a specific destruction of a characteristic element of the small brain—i.e. the Purkinje cells.

It is conceivable that such a selective destruction of a fundamental element of the cerebellum involves not only a great disturbance of the function of the organ, but also throws some light upon the mysterious mechanism of such a special part of the central nervous system. It is not necessary to remind you that, although abundant experimental and anatomico-clinical data have accumulated concerning the cerebellum much remains unknown about its functions and disorders. Indeed, a few years ago we believed that the problem of the cerebellar functions in man and in animals was simpler than it is in reality.

Recently, some experimental investigations in animals have brought to light many ideas which seem to contradict the conception suggested by pathological processes as to the cerebellar functions in man. I have in my mind the researches of Sherrington, Sachs and Finkler, Aubrey Mussen, Dusser de Barenne and, more particularly, the studies of Magnus and his pupil, Rademaker of Leyden.

Now, the experimental and clinical data are forcing us to abandon the old conception of Luciani and to bring into question again Bárány's interesting experiments, these not having been confirmed by subsequent investigators.

The same applies in the case of muscular tonus. Indeed, we cannot doubt that hypotonia is one of the outstanding results of certain cerebellar lesions in man, but we are obliged to confess that a true diminution of tonus is not absolutely certain in cerebellar deterioration caused by tumours, inflammation and, above all, by abiotrophic degeneration.

What is the reason of the contradictions or differences we notice between some recent experimental data and the classical cerebellar symptomatology in man? This question is not easy to answer. We must, however, keep in mind—and this

has not always been done—that the cerebellum is not a homogeneous organ, that it contains many centres and constituent parts; moreover, that it is affected by certain centres which play a great rôle in the muscular coördination in standing and walking.

These facts have made us realize why the different destructive processes acting on the cerebellum are not very conducive to a discovery of the real functions of the small brain. This is the reason why degeneration of the Purkinje cells appears to me so interesting from a double point of view—clinical and biological.

Observation I.—The first case is that of a man aged 79, whose past history is without interest, except that he admitted that he had been a heavy drinker. This patient was admitted to the Paul Brousse Hospital in 1919 on account of senile decay, but at that time he showed some slight signs indicating that his walking was not normal.

I was able to examine him six months later and observed that he had great trouble in standing and walking. He tottered and reeled, and to keep his balance he was obliged to spread his legs apart, and his hips appeared to sway. When I ordered him to march, his walk became easier and more correct. When placed on a bed, he could perform only very awkwardly all the classical tests for coördination. I was struck by the fact that though asynergia, lack of coördination, tremor and dysmetria were absent on the upper limbs, the lower limbs, on the contrary, were affected with these disorders. The second point that attracted my attention was the lack of appreciable alteration in muscular tone in the lower limbs as well as in the arms.

I failed to observe the slightest abnormality of sensation or loss of power of voluntary contraction; also the mental state was perfectly normal. All the deep and superficial reflexes were normal except the left ankle-jerk, which was abolished. I may add that speech, ocular movements and deglutition remained intact.

For a year the patient was under my observation and I did not notice any increase of the disease; he finally died from cancer of the pancreas at the age of 80.

In this case the symptomatology was so clear that, whilst he was alive, I had made the diagnosis of progressive atrophy of the cerebellar cortex.

The histological findings showed that this hypothesis was correct.

Observation II.—In the second case I had the opportunity of observing for three years a man aged 70. At the age of 50, he noticed an increasing weakness of his legs and an unsteadiness of gait. Nevertheless, he was able to continue his profession as a carpenter for several years, but he was unable to walk without the help of others or of sticks.

Three years ago, without any apparent reason, his difficulty in walking increased and he used crutches for both walking and standing. Later, walking and standing became quite impossible. I examined this man for the first time at that period of the disease.

The disorder of the gait and the stance was very well marked. When the patient stood, supported by two assistants, we noticed that he could not maintain his balance, but tended to pitch forward or backward. These antero-posterior oscillations were accompanied by contractions of the muscles of the calves of the legs, and the tendons on the dorsum of the feet were actively in movement in the effort to keep the balance. The gait was tottering, reeling, and waddling; while walking the patient held out his hands to grasp at a support, and his anxiety was very acute. Placed on a chair, he was unable to keep his legs still. In the recumbent position, the ataxia, dysmetria, and lack of coördination were striking, and response to the various tests—heel-to-knee, heel-to-buttock—strongly positive.

The movements of the upper limbs were not quite preserved, and though the lack of coördination was not so marked as that of the lower limbs, the finger-to-nose, finger-to-finger test, did, however, disclose a real lack of coördination.

The dysdiadochokinesis, as well as the pronator sign, was worse in the left arm. Perhaps this fact explains the great disturbance of the handwriting, which was illegible. The speech was slow, drawling, and rather shrill.

Let us turn now to the negative side of the clinical picture. The mental state, sensation, and sphincter control were not impaired; nor were the superficial and deep reflexes. Only the pendular character of the patellar reflexes and a crossed sign of Babinski could be noted.

There was no nystagmus, no focal weakness, no muscular atrophy and, in particular, not the slightest sign of hypotonia. The blood-pressure was normal and the Wassermann reaction negative.

During the three years the patient was under my care I did not observe an appreciable progression of the disease.

Observation III.—The third case is that of a man aged 60, who was admitted to the Paul Brousse Hospital on account of difficulty in walking. There was no trace of a similar condition in his family.

The first symptom of the disease had appeared five years before admission, and was characterized by a difficulty in standing and walking. The legs were becoming clumsy and awkward. The gait rapidly became swaying, reeling, and waddling (the patient said: "As though I had drunk too much"). At this time he was obliged to give up his work.

Two years ago this patient was admitted to the Salpêtrière, where he received antispecific treatment without benefit. I saw him for the first time in December 1932, and observed that his walking was seriously impaired, and that he lurched forward, and was unable to progress without being supported by somebody or with crutches.

His typical cerebellar gait showed tottering, reeling, waddling and asynergia. The legs shot forward before the muscles of his body were able to coördinate and, sometimes, he gave a sudden lurch to one side or the other. In a standing position he could not keep his balance, and his legs were spread wide apart, the antero-posterior oscillations being very apparent. Placed on a chair, he was not able to keep still; his lower limbs were alternatively flexed and extended, and his body was pitched backward or forward. In a recumbent position not only did he not show any sign of catalepsy, but he was unable to maintain a fixed position.

The tremor of the upper limbs was more marked than in previous cases, and the handwriting was illegible. The speech was drawling, slow, and staccato.

As in the other cases, I failed to observe any weakness or hypotonia of the muscles, nor were sensibility, control of sphincters, or superficial or deep reflexes affected in the slightest degree.

Comments

The observations just recorded are sufficiently characteristic and comparable with cases recorded in the literature to exempt me from a general description of the disease.

As I have said before, the syndrome of cortical cerebellar degeneration is a special organic astasia-abasia, which occurs after middle age in most cases, and often in advanced age. The average age for the development of the malady is 62, but I remember that one of my cases began at the advanced age of 80.

The first symptoms are usually insidious and impossible to specify, because of the ability of the patient to continue working, at least for a certain time.

In most cases the first phenomenon which strikes the patient is the disability in walking and standing; several of my patients have made exactly the same remark: "At the beginning of my disease I seemed to stand and walk like a drunken man." Later on the disease attacks the body equally, and increases steadily

and slowly, over a long period of years. In rare cases, like that of Rossi, an improvement has taken place at one time, but it has been followed by relapse, and the disease has advanced until the patient's death.

One characteristic is striking. The legs are always much more seriously affected than the arms, even at the terminal stage. Three patients of mine were totally unable to stand or walk without help, but they could perform many of the necessary little occupations of everyday life—such as shaving, eating, and dressing—but not handwriting which, as a rule, showed traces of incoördination and tremor, even when these phenomena were not very noticeable.

The patient's gait is tottering, reeling and sometimes rolling, like a sailor on board ship in rough weather. To maintain a correct position while standing, the patient spreads his legs wide apart and his hands are held out to grasp at some support.

I should like to insist upon an interesting fact recorded by numerous observers, namely the antero-posterior oscillations when the patient is standing. These automatic movements, which indicate a state of disordered balance, are quite different from the unsteadiness observed in tabetic ataxia or in labyrinthine disease. On the other hand, we notice that these oscillations of the body are also present in dogs that have had their cerebellum removed for a long time, like those which I have been able to examine in the laboratory of Professor Rademaker in Leyden.

Cerebellar degeneration may produce an ataxia of legs as marked as that of the most severe tabes, but it is important to note that the reactions on maintaining the balance are not at all the same in the two cases.

Rademaker has demonstrated that dogs, completely deprived of their cerebellum, show counterbalancing reactions for keeping their equilibrium, as do normal animals, whereas cats, monkeys or dogs, which have had their labyrinthine apparatus destroyed, have not shown such counterbalancing reaction.

In order to study these reactions in man, Rademaker and Garcin made a new experiment similar to those which Rademaker has made on animals, especially on dogs. I was able to test this experiment with Professor Rademaker himself, on several patients from the Paul Brousse Hospital, and I appreciate its value. This test consists in placing the patient on a bed in the attitude of a quadruped, and in producing unexpected displacements along the longitudinal and transverse axes. Under these conditions, we can see the limbs extend and flex in harmony with the displacement of the body. The behaviour of patients affected by deterioration of the cerebellar cortex is exactly the same as that of a normal subject, whereas the patient whose labyrinthine apparatus is impaired shows loss of balance and falls forwards, backwards, or to one side.

Pathological Data

If the clinical picture of this disease is striking enough to make the diagnosis, in most cases, an easy matter, the pathological data are also quite characteristic.

Macroscopically, the cerebellum is described as being greatly reduced in size, and many authorities have pointed out that the atrophy does not spread to the mass of the small brain, but that it is more or less strictly confined to the vermis and the adjacent part of the lateral lobes. As a rule, atrophy is more marked in the antero-superior part of the vermis, and the pathological process leaves the peduncles and the pons absolutely intact. Microscopical examination confirms these appearances.

The following are the fundamental histological characteristics of cerebellar deterioration: First, in the altered, atrophied, and shrunken parts, microscopical examination shows a disappearance of the Purkinje cells (fig. 1); in certain small areas there are occasional areas where traces of deterioration are visible. On the other hand, the absence of Purkinje cells produces a very pale, narrow division between the molecular and granular layers.

In the parts where the pathological process is still active, the appearance is different: here we see numerous Purkinje cells, but none of them has kept its normal structure. The body of the cell is reduced, has shrunk and lost all its processes, the nucleus is deformed, and in many parts only a vestige of the Purkinje cells remains.

In the two other layers of the cerebellum the damage is far from being so marked. The nervous elements of the granular layer show a certain degree of shrinkage, as do those of the molecular layer, but these changes do not exceed the

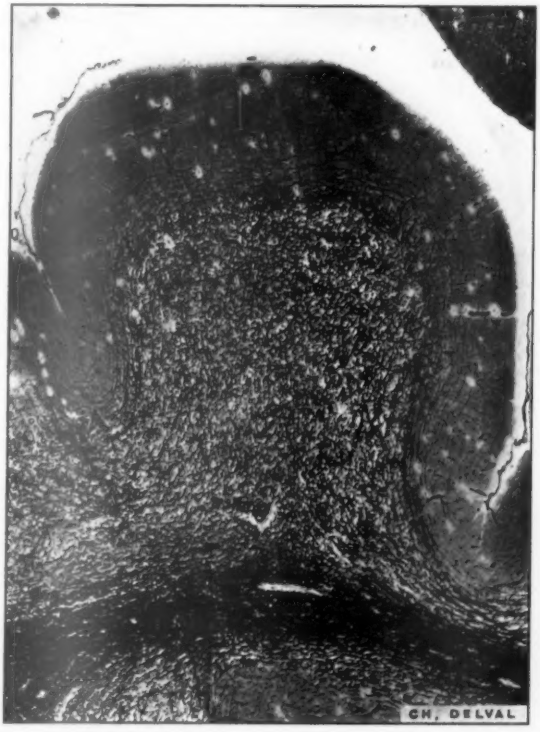

FIG. 1.—Senile cerebellar atrophy. Disappearance of Purkinje cells with preservation of the basket-fibres. Tangential and molecular fibres are rarefied. (Bielschowsky's silver impregnation method.)

maximum degree of alteration that we are accustomed to see in the cerebellum of elderly people.

With the use of silver-stains we can appreciate more accurately some other characteristics of the pathological process. I have in mind the preservation of the nerve-fibres in the two granular and molecular layers, and, particularly, the apparent hypertrophy of the basket-fibres surrounding the Purkinje cells (fig. 2). It is very interesting to see in the most damaged areas the entire destruction of the cell-bodies, contrasting with the abundant unmyelinated fibres which form an empty nest

FIG. 2.—Hypertrophy of the baskets: rarefaction of the fibres running through the granular layer. (Bielschowsky's stain.) [With acknowledgments: "Cliché Institut Cancer, Paris."]

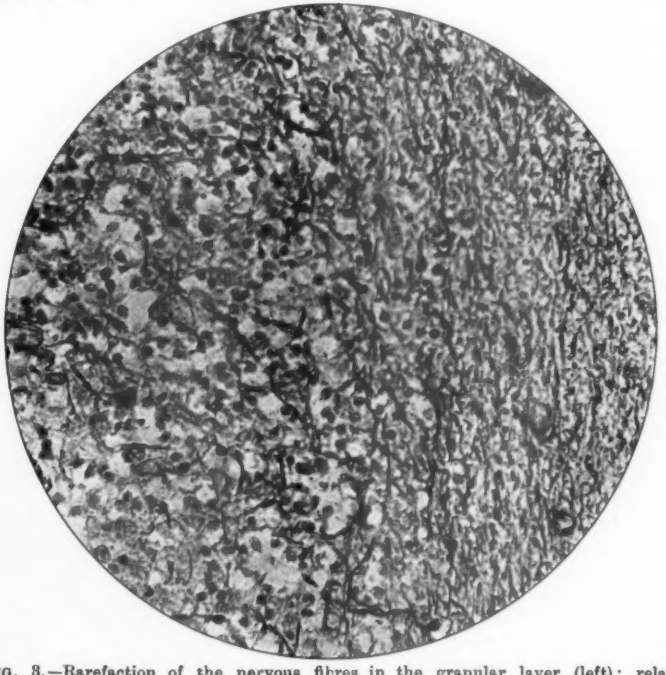

FIG. 3.—Rarefaction of the nervous fibres in the granular layer (left); relative preservation of the axis-cylinders of the white matter of the lamella (right). (Bielschowsky's stain.) [With acknowledgments: "Cliché Institut Cancer, Paris."]

around what remains of the cell. We notice, too, that in the molecular and granular layers there are innumerable myelinated and unmyelinated fibres running in several directions, some of them entering the nerve-fibre layer (fig. 3).

I may add that we have failed to observe the curious alterations in the ramifications of the Purkinje cells, which have been accurately described by Estable and F. de Castro under the names of snake-like (ophidiose) cells, wall-fruit cells, balloon-shaped swellings of the basal axis-cylinders—alterations which occur in other chronic forms of cortical cerebellar degeneration, such as the cortical type of Friedreich's disease, and which, with my pupil Trelles, I have studied in the case of hereditary ataxia.

The use of glia methods is less instructive than those of silver stains. However, like Pierre Marie, Foix and Alajouanine, I have been able to observe an undeniable proliferation of the fibres of neuroglia in the white matter of the lamellæ, ending with a line of demarcation where the white matter of the folia meets the oval centre of the cerebellum. In the molecular layer, the Bergmann's fibres appear to be more dense than in the normal cerebellum of a patient of the same age.

As I have said, in cases of pure cerebellar deterioration the lesions are confined to the Purkinje layer, the cerebellar peduncles and the nucleus dentatus being intact. This rule cannot, however, be applied to the inferior olivary nucleus; P. Marie, Foix and Alajouanine have made some interesting deductions confirming this. Like Stender and Luthy, and La Salle Archambault, these authors have reported that, in two cases out of five, not only is there deterioration of the olivary cerebellar fibres but there is also atrophy of the olivary cells accompanied by a glial process. These olivary alterations seem to have a special localization, decreasing towards the rostral extremity of the olive. This is in accordance with the anatomical data reported by Gordon Holmes and Grainger Stewart, Henschen, and the experimental investigations made by Keller.

But must we consider all the olivary lesions as secondary to vermian deterioration? That is a question not yet solved. In my opinion, the changes in the olives have a double origin; some of them are caused by vermian deterioration, while others are due to a special factor which appears to be independent of any vermian alterations. Indeed, as I have demonstrated with my collaborator Trelles, the olivary alterations are very common in elderly patients and they have two different aspects —atrophic and hypertrophic. In the delayed degeneration of the cerebellum, the olivary complex appears generally atrophied, and this is in favour of a secondary process, but, I repeat, the olivary hypertrophy is in fact much more frequent than is usually admitted, and we can easily suppose an association of this lesion with cerebellar degeneration. This olivary hypertrophy is not dependent on the cerebellar lesion; with it, we face a local pathological process determined by vascular lesions. As we see in the Bielschowsky's case, that, as the physio-pathological explanation, the olivary alterations must not be underrated, for they made it possible for us to understand some atypical cases of cerebellar deterioration (fig. 4).

As I have already said, delayed cerebellar degeneration does not produce any great change in the muscular tonus (I do not mean passivity or the loss of antagonistic reflexes), but in some cases we can even observe an increase of muscular tonus; this leads one to believe that another lesion has been added to the principal one and, for that reason, the new pathological condition involves the olivary complex.

It is well known, now, that the olivary body represents one part of the regulating apparatus of muscular tonus and, since the researches of Winkler, Guillain and Bertrand, we cannot doubt the close connexion between the olivary and striate bodies through the striate-olivary tract. In every case in which the histological findings demonstrated a hypertrophic state of the olivary bodies, the patients had increased muscular tonus. This is the reason why I am pleased to record the following observation, for it is not exactly of the same type as the preceding ones.

Observation IV.—A woman, aged 70, was admitted to the Paul Brousse Hospital in 1920 on account of senility. At that time she was perfectly healthy; two years later she complained of trouble with her speech and gait. She said she could not bend her legs when walking, she was unable to walk straight, and she told the nurses that her walk was becoming clumsy and unsteady, like that of a drunken woman.

In 1929, all the motor troubles increased; the difficulty in walking became so severe that she was only able to take a few steps supported by two assistants.

The signs of cerebellar deterioration were exactly the same as those described in the previous cases. Standing and walking were not possible unless the patient was

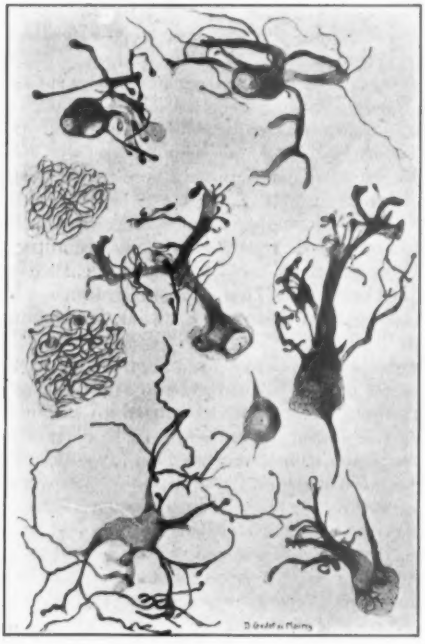

FIG. 4.—Alterations in the cells of the bulbar olive in the case of "Hypertrophy of the olive." (Lhermitte and Trelles.) (Bielschowsky's stain.)

supported by two people or held on to two chairs. Antero-posterior oscillations were present when she was in a standing or sitting position; all the tests for the coördination of the lower limbs were positive, dyssynergia, dysmetria, tremor and so on.

I failed, however, to discover the slightest sign of hypotonia or passivity. On the contrary, if the patient went on all fours, we noticed immediately an increase of muscular tonus; all four limbs became very extended, and her back was able to support a heavy weight without giving way. When she was in the erect position, the hypertonus was not so evident, but nevertheless it was demonstrable.

In this case, which is still under my observation at the Paul Brousse Hospital, we have examined with particular attention the labyrinthine reflexes, the past-pointing test, before and after the stimulation of the ear, and the Rademaker-Garcin's test for equilibrium. All these reactions were perfectly normal, as were also the superficial and deep reflexes, the sensation, the sphincter control and the mental state. The Wassermann reaction was negative in the blood.

This observation can be closely reconciled with those recorded by Guillain, Bertrand, Bielschowsky.

As we have seen, cerebellar degeneration may be associated with a correlative alteration of the olivary body, but some recorded observations demonstrate that in certain cases the disease is complicated by other structures being involved—for example, the nucleus dentatus and the striate body, as in Ley's observation, or the pyramidal tract, as in Nikitin's case.

The involvement of these structures clearly explains the clinical diversity of the syndrome, but, in spite of the relative variability of both clinical and pathological pictures, cortical cerebellar degeneration remains a very distinct affection, and the characteristics peculiar to it make it stand out from other cerebellar diseases, such as olivo-ponto-cerebellar atrophy, olivo-rubro-cerebellar atrophy, and particularly from the type of familial degeneration described by Gordon Holmes.

Pathogeny

It is not my wish to focus your attention on the causes of the disease for we should then be treading upon much less certain ground.

The antecedent phenomena in the disease are very variable and uncertain. The idea of an early infectious process preceding the appearance of the first symptoms is still a pure hypothesis in spite of the facts recorded by Murri and others.

In support of the theory that this is a virus-disease, H. L. Parker and J. W. Kernohan, in their recent paper published in *Brain*[1] emphasize the fact that a similar disease exists, which affects animals and is characterized by a specific destruction of the Purkinje cells. Occurring in epidemic form in sheep, this has been called "louping-ill," and it is transmissible to mice; Kurat, who produced this affection in monkeys, noted that it was characterized by increasing cerebellar ataxia. I will not deny that a possible analogy between louping-ill and cerebellar atrophy may exist, but it is impossible not to see that the anatomical lesions in the syndrome are quite different. At the necropsy of animals dying from "louping-ill," the massive destruction of Purkinje cells was accompanied by a more or less diffuse encephalomyelitis.

The somewhat strictly selective localization of the pathological process to the palæocerebellum has forced some authorities to the hypothesis of a premature senescence of certain elements of the nervous system, namely, the Purkinje cells, whose changes in old age are well known. But to speak of premature senility acting upon certain systems is not to give an adequate explanation, and we may be allowed to ask what is to be understood by such a selective and precocious decay.

Let us now turn our attention in another direction. Some observations, like those recorded by Stender and Lüthy, A. Thomas, Kirschbaum and Eichhorst and myself, have shown that the disease may be preceded by an intoxication, and especially by chronic alcoholism. Now, we are told that the Purkinje cells are especially vulnerable to certain toxic substances such as alcohol, lead, and organic toxins. Ferraro and Hernandez, in experimenting on animals, have demonstrated the destruction of Purkinje cells by alcoholic intoxication; and in a series of investigations not yet

[1] *Brain*, 1933, lvi, 191.

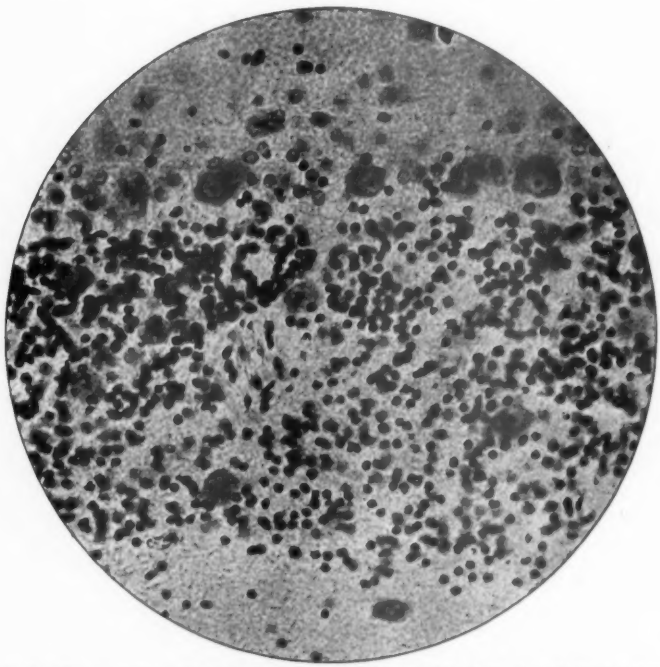

FIG. 5.—Degeneration of the Purkinje cells of the rabbit after chronic lead poisoning. The Purkinje cells are devoid of dendrites; some of them are deeply stained. The absence of glial proliferation may be noted. (Nissl's stain.)

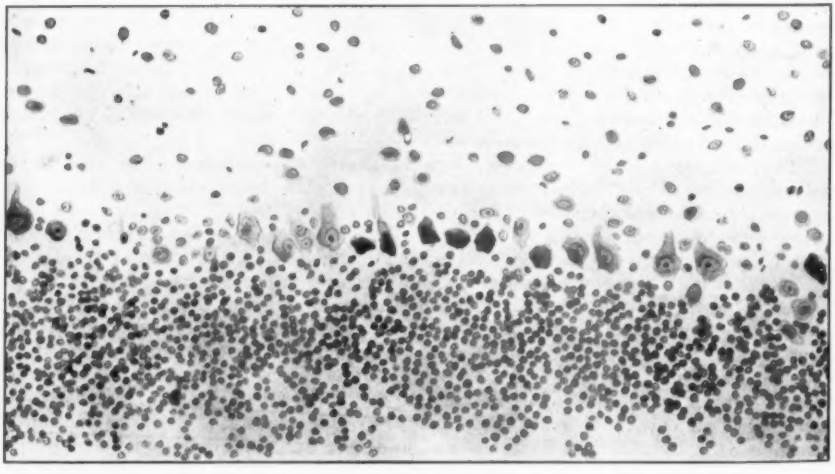

FIG. 6.—Degeneration of the Purkinje cells of the rabbit. Chronic intoxication by lead. (Diethylphosphate of lead). (Nissl's stain.)

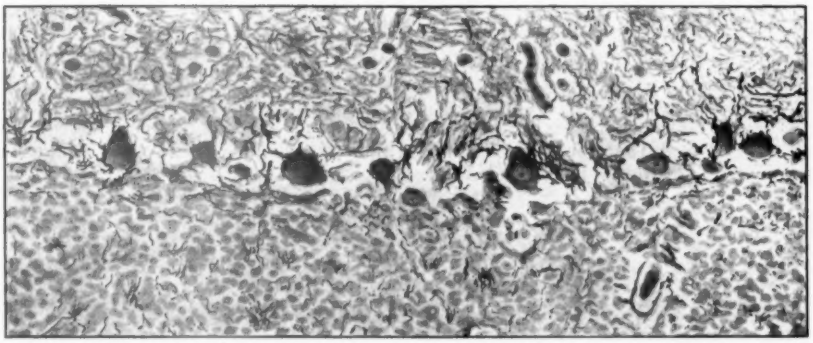

FIG. 7.—Degeneration of the cortex of the cerebellum in a case of chronic lead poisoning (rabbit). A few normal Purkinje cells remain, showing gross atrophy and disappearance of the nucleus. The basket-fibres are preserved. (Bielschowsky's stain.)

published, I found, with Dr. Kulikowsky, that intoxication by alcohol or lead produces a remarkable alteration in the Purkinje layer. Previously, Villaverde had made a similar observation (figs. 5, 6, 7).

However, these facts do not give us a complete explanation of what we have in mind ; they merely indicate the way we should proceed.

MECHANISM OF THE DISTURBANCES OF COÖRDINATION

All the authorities who have studied delayed cerebellar degeneration agree that the deterioration of the small brain is limited to the Purkinje layer in the majority of cases, and that in some cases the lesion is associated with a deterioration of the olivary body. Such a selective destruction of a specific element of the cerebellum facilitates our discriminating the functions of the cerebellum.

As I have said, in agreement with other observers, the destruction of the Purkinje cells alone does not greatly alter the tonus of muscles, whilst the disorder of cöordination marked by unsteadiness in standing and walking appears to be intense. From this fact, a double conclusion has been drawn : first that the palæocerebellum regulates the harmony of the movements of the lower limbs and, secondly, that the Purkinje cells represent an essential element in the mechanism of muscular coördination.

Professor Jelgersma appears to be the most representative scientist to hold this conception. According to this author, a Professor of Groningen, who has recently devoted a long article to this subject, the Purkinje cell is the central point of the mechanism, upon the integrity of which our automatic reflexes and voluntary movements depend. Through the Purkinje cell, says Jelgersma, a dual impulse, or wave of activity passes : one coming from the periphery, i.e. the spinal cord, the other coming from the brain itself by way of the Türck's and Arnold's tracts and middle peduncles. These two waves pass through the Purkinje cell representing two " Bewegungsbilder," two schemes of movements, one originating from the spinal cord and the other formed in the brain. If the two schemes harmonize, the Purkinje cells do not act ; if they are defective or if they do not coördinate, the Purkinje cells correct this lack of harmony. I will not discuss this theory of Jelgersma's, for it seems to me very hypothetical ; I have mentioned it only for its heuristic value.

What is proved is the existence of a definite cerebellar disease—occurring particularly in the aged—whose clinical and anatomical characters are, on the one hand, the selective destruction of the Purkinje cells, and on the other, a kinetic and static ataxia.

This affection is a new example of the surprising selectivity of the pathological processes which are able to exclude such and such an element of a complex nervous mechanism, and therefore throws more light on such delicate and mysterious functions as are those of the cerebellum.

Section of Tropical Diseases and Parasitology

President—P. H. MANSON-BAHR, D.S.O., M.D.

[*December* 6, 1934]

Malaria in Nyasaland

By J. GORDON THOMSON, M.B., Ch.B.

THIS visit to Nyasaland was made possible by a grant from the Milner Research Fund, and I am indebted to the Colonial Office and to the Government of Nyasaland for their help and assistance during my work. I have specially to tender my thanks to His Excellency the Governor, Sir Hubert Young, and to all those serving with him in an official capacity for their courtesy and kindness. Dr. A. D. J. B. Williams, the Director of Medical Services, and all the medical men both in Government Service and in Missions, made it possible for me to examine numerous cases of children and women during pregnancy. I also owe a deep debt of gratitude to my friend and collaborator, Dr. W. A. Lamborn, who not only helped, but stimulated and encouraged me throughout this investigation.

[The topography and climate of the country were then described.]

The Population of Nyasaland, with a Note on Vital Statistics.

When the 1901 census was taken, the total European population numbered only 314; by 1911 this had increased to 766 and at the last census (1931) the increase was still maintained, there being 1,975 persons, mostly engaged in Government employ, Christian missions, planting, commerce, and railways. At the time of the last census there were 1,591 Asiatics, mostly traders, while the native population totalled about 1,599,880. It is greatly to be regretted that, as was pointed out by Follit (1932), the potential value of these accurate census returns largely is stultified by the absence of birth and death records and that it is not possible to determine a general death-rate, a birth-rate, or an infantile mortality rate.

The population was divided, at the time, into three age-groups, viz. 0 to 5 years, 5 to 15 years, and adults. Follit considers it to be a fair deduction to make from the census returns that an enormous wastage of life occurs between the ages of 0 to 5 years, and that in every 100 infants born probably not more than 30 survive the first year of life, and not more than 10 in every hundred live to be 6 years of age. In the Annual Medical Report for last year, Dr. Williams (1934) gives a short note on vital statistics and quotes an experiment on registration which was started at Fort Manning in 1932. The system adopted is not official, but chiefs and village headmen are co-opted and native recording officers are employed. There is no compulsory registration and the margin of error must be considerable. Little or no attempt has been made to record the causes of death. The figures in this experiment at Fort Manning are as follows: birth-rate per 1,000 was 68·2 and death-rate per 1,000 was 25·8. The infantile death-rate per 1,000 births was 97·3 and the still-birth-rate per 1,000 live births was 89·3. The infantile mortality is very high, and when the mode of life of the natives is considered, this is not surprising. It is quite impossible to estimate to what extent the death-rate in infants is due to malaria or to the many other prevalent diseases. Malaria is so widespread that it must play a large part in the death-rate of young children. Bilharzia, ankylostomiasis, and

other intestinal worms are so common that about 80 to 90% of the children showed a degree of eosinophilia. At Cholo, Dr. Gopsill reported *S. hæmatobium* eggs in 82% of those examined, and at Kota-Kota 82·1 were infected with the same parasite. Yaws and venereal diseases are common.

The Medical and Sanitary Services.

The Medical Service consists of a Director of Medical and Sanitary Services, a Senior Health Officer, a medical entomologist, fourteen medical officers, a bacteriologist, a matron, and ten European nursing sisters. In addition there are two sanitary superintendents and a clerk and medical storekeeper. This small, but highly efficient European staff, are engaged in the colossal task of looking after the general health of the Europeans and of a huge native population of one million and a half, and in investigating and improving sanitary conditions. There are ten sub-assistant surgeons, all Asiatics. African natives are being gradually trained in medical work, and at present a staff, 534 strong, are employed as hospital attendants, dispensers, sanitary inspectors, and vaccinators, while some 240 more natives are employed as sanitary labourers.

The gradual extension of preventive medicine is in progress, but the task of controlling disease over this huge area occupied by primitive natives is limited by the economic state of the country, and is hampered by the ignorance and mode of life of the natives. The government medical service is ably assisted by medical practitioners associated with Christian Missions scattered throughout the territory. Recently three Women and Child Welfare clinics have been approved. An elementary knowledge of hygiene is being taught in native schools, and anti-mosquito work is in continual operation around the larger European populations.

The Seasonal Incidence of Malaria and Blackwater Fever in Nyasaland and their Correlation with Rainfall and Anopheline Density.

The months of June, July and August are practically rainless, and during this dry season vegetation lies dormant ; the rainy season usually begins in October and continues until the end of March. The rains fill the rivers, which overflow and form vast lakes and marshes, and recently the water level of Lake Nyasa has been steadily rising in a remarkable manner. This has resulted in the flooding of low-lying regions around the lake shores. Lamborn (1925) clearly demonstrated that *Anopheles funestus* persisted in large numbers throughout the entire year, but that *Anopheles gambiæ* is extremely rare during the dry months. The failure of Daniels (1900) to find *A. gambiæ* in the Shire Highlands and the Upper Shire Valley was due to his having visited these areas in the dry season, and for the same reason, Newstead and Davy (1911) were able to find only a single specimen of *A. gambiæ*.

Lamborn (1925) graphically demonstrated the marked increase of numbers of *A. gambiæ* during the rains (Chart I) and, from figures of cases of malaria collected by the late Dr. Milne Tough, it was evident that the incidence of clinical malaria rose steadily with the rainfall and the increase in prevalence of *A. gambiæ*. Cases of malaria appear in October and steadily rise in numbers during November, December, January, and February, and then tend to fall. During the dry season, May, June, July and August, the incidence of malaria is low. Shelley (1931), in an analysis of 67 cases of blackwater fever, showed that, while this disease may occur at any time of the year, nevertheless the highest incidence of cases occurred in May, June, and July, that is to say, immediately after the intensity of malaria had become manifest. The state of affairs in Nyasaland bears a remarkable resemblance to what was found in Southern Rhodesia by Thomson (1924), Leeson (1931), and Ross (1932), and confirms the fact that there is a definite co-relationship in both areas between rainfall, temperature, anopheline density, malaria, and blackwater fever. It will be noted (Table I) that, from the observations of Lamborn (1925) in

TABLES A.B+C SHOWING ACTUAL NUMBERS OF ANOPHELINES TAKEN IN EACH MONTH IN THREE DIFFERENT STATIONS IN NYASALAND. (AFTER LAMBORN 1925).

TABLE A. CATCHES MADE THREE TIMES A WEEK IN NATIVE HOSPITAL. FORT JOHNSTON. HOSPITAL SITUATED ABOUT 30 YARDS FROM THE SHIRE RIVER.

	JAN:	FEB:	MAR:	APR:	MAY	JUN:	JUL:	AUG:	SEP:	OCT:	NOV:	DEC:
A. gambiae. (FEMALE)	254	480	45	10	19	8	8	25	24	12	7	33
A. funestus. (FEMALE)	849	808	181	97	258	472	770	1094	1374	596	608	951

TABLE B. CATCHES IN NATIVE GAOL, ABOUT 130 YARDS FROM SHIRE RIVER.

	JAN:	FEB:	MAR:	APR:	MAY	JUN:	JUL:	AUG:	SEP:	OCT:	NOV:	DEC:
A. gambiae. (FEMALE)	68	274	462	130	113	187	72	23	7	10	5	2
A. funestus. (FEMALE)	1500	1921	571	309	365	761	744	785	818	2007	1664	1057

TABLE C. CATCHES IN A NATIVE HUT AT A DISTANCE OF TWO MILES FROM THE SHIRE RIVER.

	JAN:	FEB:	MAR:	APR:	MAY	JUN:	JUL:	AUG:	SEP:	OCT:	NOV:	DEC:
A. gambiae. (FEMALE)	57	147	172	26	98	23	11	3	—	—	3	15
A. funestus. (FEMALE)	240	482	164	13	230	462	256	13	48	134	336	215

TABLE D. CATCHES IN SOUTHERN RHODESIA. (AFTER LEESON 1931). THESE INCLUDED CATCHES OUTSIDE, IN BLACKWATER HOUSES, NATIVE HUTS, OUTHOUSES, STABLES AND EUROPEAN HOUSES. SHAMVA.

	JAN:	FEB:	MAR:	APR:	MAY	JUN:	JUL:	AUG:	SEP:	OCT:	NOV:	DEC:
A. gambiae. (FEMALE)	55	111	209	84	2	—	—	—	—	—	2	11
A. funestus. (FEMALE)	111	282	332	110	58	158	15	26	1	8	6	—

TABLE I.

Nyasaland, and those of Leeson (1931) in Southern Rhodesia, *A. funestus* persists throughout the year but increases in density during the wet season. *A. gambiæ*, on the other hand, almost entirely disappears during the dry months of the year. As *A. funestus* has been proved to be an active transmitter of malaria, this mosquito must be wholly responsible for any infections which occur during the dry season. It is extremely difficult to decide to what extent fresh infections of malaria are contracted during the dry season.

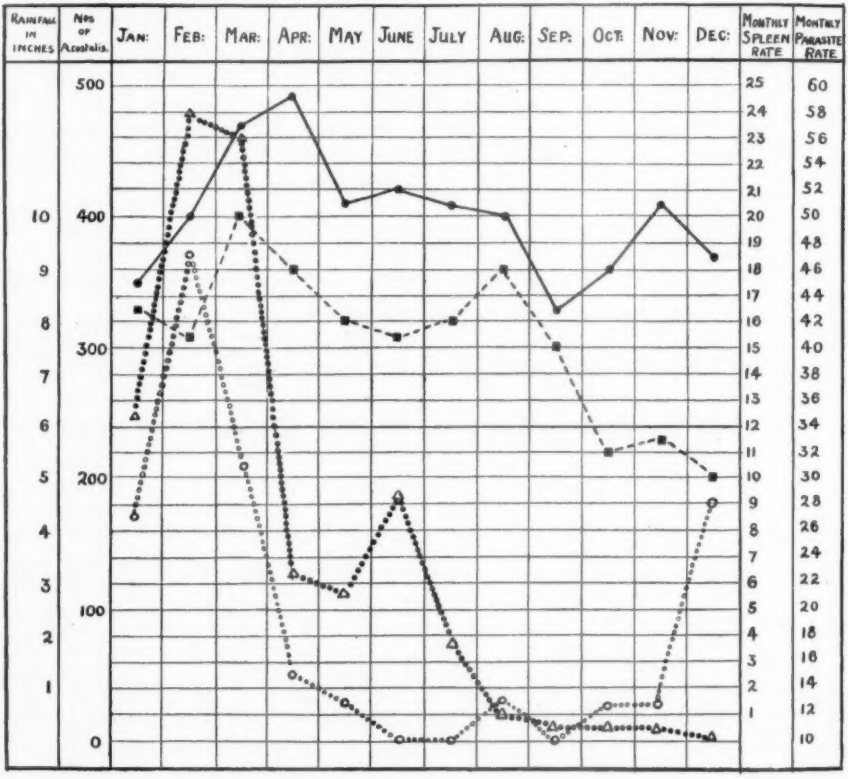
Rainfall in Inches
Nos of A.costalis.
Jan: Feb: Mar: Apr: May June July Aug: Sep: Oct: Nov: Dec:
Monthly Spleen Rate
Monthly Parasite Rate
500
400
300
200
100
0
10
9
8
7
6
5
4
3
2
1
25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10
Rainfall. Nos of A.costalis. Spleen Rate. Parasite Rate.

CHART I.

An examination of the incidence of malaria in native children in Nyasaland clearly shows that malaria persists throughout the whole year (Table II), but that the peak of highest incidence is associated with the increased density of anophelines accompanying the annual rains (Chart I). Observations would seem to show that the anopheline density of the wet, hot season of the year is due to an increase in numbers and biological activity of both *A. gambiæ* and *A. funestus*, and that during that time both species are actively engaged in biting man. Thomson (1924) in Southern Rhodesia drew attention to the fact that malaria and blackwater fever were definitely associated with the appearance of *A. gambiæ* in the European houses,

but Leeson (1931) in the same area has demonstrated that *A. funestus* also increases steadily in numbers during the wet season. As an explanation of the fact that the endemicity of malaria is low during the dry season, although there is an efficient carrier available (*A. funestus*), it may have to be assumed that either *A. funestus* is not infected or that its biting activities are not so marked. At the present moment this question is not solved but it seems reasonable to suppose that, during the dry season, the adults of *A. funestus* resting in houses are not actively engaged in ovipositing, and consequently are not so urgently in need of blood. If *A. funestus*, although abundant, is really quiescent and *A. gambiæ* is almost absent, this would explain the scarcity of fresh acute cases during this period of the year. With our present knowledge no estimate can be formed of the extent to which malaria during the wet season may be due to *A. gambiæ* or *A. funestus*.

In a personal communication, Sir Malcolm Watson has shown that at a mine in N. Rhodesia, although almost complete control of *A. gambiæ* has been established, the malarial incidence has been maintained owing to the persistence of *A. funestus*, but at a lower level. This seems to be a distinct proof that both these anophelines play a part in the production of epidemic malaria during the wet season. However, in the Heath Clark lectures, Hackett (1934) raises this problem above the simple one it would at first appear to be. Evidently any anopheline species is capable of producing, under certain biological or ecological conditions, different races which, owing to their feeding habits, differ in their importance as malaria transmitters. Leeson (1930) has drawn attention to the variations in the wing ornamentation of *A. funestus* of Southern Rhodesia, and has emphasized the fact that further study of this anopheline is necessary to determine whether certain biological races occur, which differ from one another to such an extent that one race may transmit human malaria and others be of little importance.

Examination of the Peripheral Blood of Native Children under 10 years of age to determine the Parasite Rate and the Species of Parasites found.

In order to determine the parasite rate and the percentages of the various species found, an examination of the blood was carried out in native children under the age of 10 years, and only thin films were used throughout. (1) Several groups of children from different areas were examined on one occasion only. This might be termed "random sampling" and obviously furnished data for only one particular period of the year. (2) In order to get more accurate details, Dr. Lamborn and the author collaborated in a survey in which 103 children were examined once a month during the year 1931, for the presence of splenic enlargement and parasites. This group of children were living continuously throughout the year in the same village under hyperendemic conditions. A comparison between these two methods of examination shows the importance of the latter method in estimating the true state of malarial infection in any area, and the results would be even more accurate if it were possible to examine a group more frequently, say, once a week.

By the first method three groups of children from birth to 10 years of age were examined on one occasion only, and the results were as follows:—

(*a*) In a village twelve miles from Fort Johnston, at a height of just over 3,000 feet above sea-level, 103 children, all under 10 years of age, were examined during March and April 1934. In thin films the parasite rate was 50%. Of these positives, 85% were *Plasmodium falciparum* and 15% were *P. malariæ*. No infections with *P. vivax* were detected. Crescents were present in 7·5% of the positive films and quartan gametocytes in 7·5%.

(*b*) In a group of children from the Zomba area at an elevation of about 4,000 feet, in the month of April the parasite rate was 57%, and again of these positives 91·8% were *P. falciparum* and 8·2% were *P. malariæ*. Again no infections

with *P. vivax* were detected. Crescents were present in just over 5% and quartan gametocytes were also about 5%.

(*c*) A third group of children, 233 in number, were collected from various villages on the Angoniland plateau at a height of 4,000 feet or over, from villages at the lake level, from Kota-Kota, and Cholo. These were examined during the dry season and the parasite rate was only 43%. *P. falciparum* formed 83% of the infections. *P. malariæ* was found in 16% and *P. ovale* in 1%.

	All Forms of Parasites. Including Asexual Forms and Gametocytes.							Gametocytes only					
	M.T.	M.T. + Q.	Q.	M.T. + B.T.	BT	M.T. Q. B.T.	Total	M.T.	Q	B.T.	M.T. + B.T.	Total	Pig: Leuc:
Jan:	32	5	3				40	3	8			11	
Feb:	33	6	5				44		7			7	
Mar:	43	4	6				53	2	6			8	1
Apr:	51	1	2	2			56	4	1	1		6	
May:	42		5	1	2		50	6	3	2	1	12	3
Jun:	44	2	4				50	5	1			6	3
Jul:	37	2	5	1	3		48	8	4	2		14	
Aug:	42	2	1	1	1		47	7	1	1	1	10	1
Sep:	35	3	2				40	2	4			6	
Oct:	38	2	4				44	6	4			10	
Nov:	44	5	1	1			51	1	5	1		7	
Dec:	35	5	2				42	1	3			4	
	476	37	40	6	6		565	45	47	7	2	101	8

Findings in 103 Children. Month by Month.

Table II.

The result of this random sampling of about 400 native children by using thin films only, thus gave a parasite rate varying from 43% to 60%, a variation due possibly to the time of the making of the survey. *P. falciparum* varied from 92% to 83% and quartan varied from 8% to 15%. No cases of *P. vivax* were detected but three cases of *P. ovale* were found. Two of these occurred at Cholo and one in a village in the Angoniland plateau.

The second method of making the survey was to examine a group of 103 children each month throughout the year, and the findings are interesting when compared

with those given above. This group was examined by Lamborn and the writer in 1931, and the investigation was carried out in the same village situated twelve miles from Fort Johnston, as was the first of the preceding investigations. Table II on previous page shows the actual parasite findings in the group each month. The monthly spleen rate has already been published by Lamborn (1932). It is now possible to correlate the parasite rates and the spleen rates (Charts I, II, III, and IV).

Ninety-nine out of the 103 children were positive at one time or another throughout the year, and four children remained consistently negative. The parasite

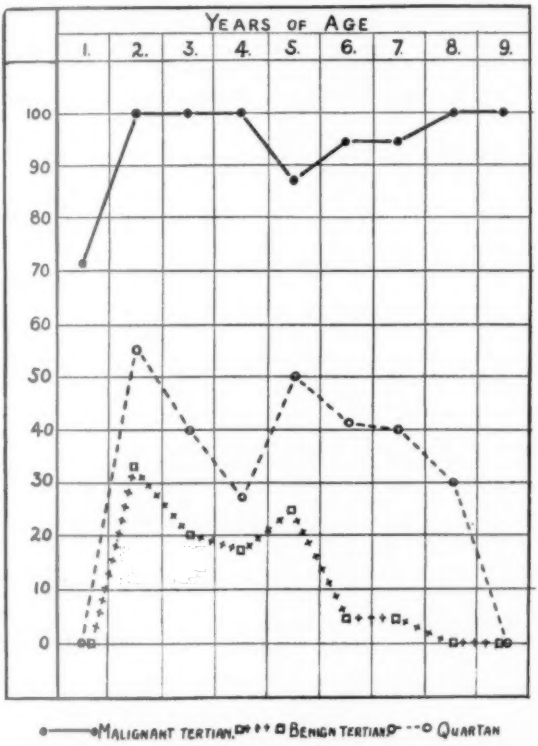

CHART II.—Percentage of children infected, according to age.

rate was therefore 96%. *P. falciparum* was found in 96 different children, *P. malariæ* occurred in 35 and *P. vivax* in eight. Of the positive children, therefore, 97% showed at examination *P. falciparum*, 35% *P. malariæ* and approximately 8% harboured *P. vivax*. Of these infections gametocytes were present in the children on 101 occasions. Crescents of *P. falciparum* occurred 47 times and gametocytes of quartan were found also 47 times, whereas gametocytes of *P. vivax* were only found on nine occasions.

A more detailed examination of this group shows that the parasite rate and spleen rate rise definitely during the months of March and April, that is, during the time

when anophelines are most active (Chart I), and when there is definite correlation with the rainfall and *A. gambiæ* density, as shown by Lamborn (1932).

If the infections be grouped according to age, it is seen that *P. vivax* drops as age advances, and shows the most rapid fall. This is followed by a drop in quartan infections, but *P. falciparum* seems to persist till 9 years of age at least without showing any fall in the numbers infected (Chart II). Gametocytes are most numerous in the blood of children about 2 to 3 years of age, and as age advances gametocyte carriers become less numerous. Here again the gametocytes of *P. vivax* show the most rapid drop as age advances and are followed by those of *P. malariæ* and *P. falciparum* (Chart III).

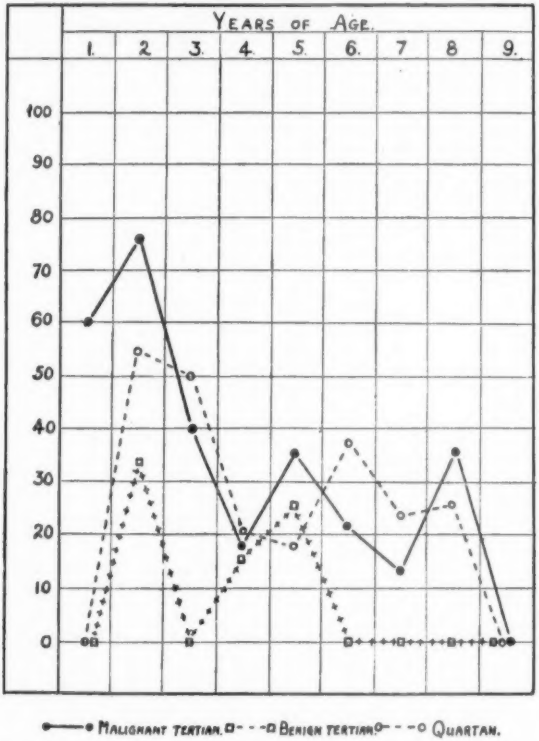

CHART III.—Percentage of gametocytes in infected children, according to age.

This development of tolerance has been observed by Ciuca, Ballif and Chelarescu-Vieru (1934), who found, under experimental conditions, that immunity is also produced against quartan malaria by repeated infections, but that the process is of slower development than the immunity towards benign tertian, and that immunization against *P. falciparum* takes longer than against either benign tertian or quartan malaria.

It seems, therefore, that immunity is most rapidly established against *P. vivax*, followed by a more gradual development of immunity against quartan, and that *P. falciparum* is by far the most persistent parasite as age advances. The

examination of the cases above also showed that native children living under identical conditions in a hyperendemic zone show very varied degrees of resistance to infection. The four children in whose blood parasites were not found were either not infected or, as is more probable, had an infection so low that it was never detected. Knowles (1934) has demonstrated the interesting fact that latent malaria in monkeys may be stimulated into activity by extirpation of the spleen. Other children showed moderate susceptibility to infection, and again a further group were highly susceptible. This may be compared with the observations made on non-immunes during experimental infections with *P. vivax*.

Yorke and Macfie (1924), Yorke (1925 and 1926), Rudolf (1926), James (1926), James and Shute (1926), and James (1931), have all noted that a considerable percentage of individuals are refractory to induced malaria. James (1926 and 1931) has emphasized this varied resistance of individuals who have never before suffered from malaria. It has been proved that experimental acquired immunity can be developed in man. The work of Yorke and Macfie (1924), Nicol and Steel (1925), James (1926 and 1931), and Rudolf (1926), has shown that, if one strain of

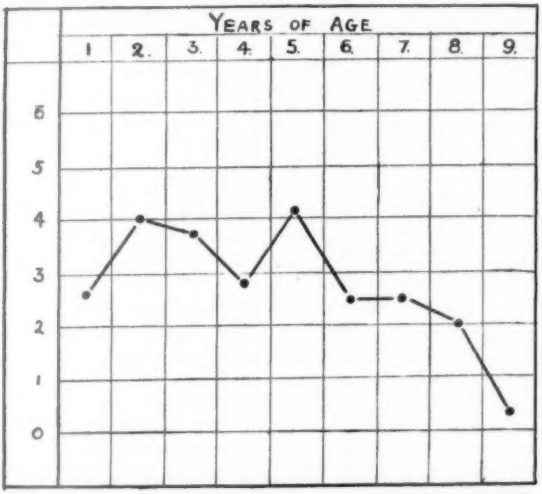

CHART IV.—Average number of enlarged spleens in 103 children, according to age.

P. vivax was used, an immunity to this strain developed. Patients immune to one strain may be successfully inoculated with another strain.

According to the findings of gametocytes in the native children, it appears that the chances of mosquitoes being infected with *P. falciparum* and *P. malariæ* were equal, and thus one would expect that the percentages of parasite findings of *P. falciparum* and *P. malariæ* would be identical in Nyasaland. It is quite possible that all the children are actually inoculated with both parasites but that the quartan infection is held in check by the presence of *P. falciparum*. The gradual development of resistance to infection is also graphically seen in the drop in the spleen rate as age advances (Chart IV).

Increase of Immunity with Increasing Age.

From the results of the parasite and spleen surveys given above, it is apparent that the development of tolerance, even under hyperendemic conditions, is a gradual process. As was pointed out by Christophers (1924) in India, acute infestations

with malaria accompanied by severe clinical symptoms occur in young infants between the ages of 0 and 2 years, and immune infestation accompanied by a lower parasite infection and slight clinical symptoms gradually develops up to the age of 10 years.

In Nyasaland the conditions are similar to those described by Christophers. During the height of the malarial season young native children up to the age of 2 years frequently have as many as three or four parasites to one red cell, and many develop convulsions which may lead to a fatal termination. According to Dr. Turner of the Livingstonia Mission at Loudon, North Nyasaland, such cases with this clinical picture and fatal termination are quite common. He states quite definitely that such cases occur during the height of the malarial season about the month of March. If the infection is detected before the onset of the serious clinical symptoms, the administration of quinine will save the child. Severe infections also occur in European children but at rather different ages, owing to the absence of any developed tolerance. Again the clinical picture is frequently one of convulsions. The gradual development of tolerance to the parasite and clinical symptoms is illustrated by the surveys detailed above, especially that carried out throughout the whole year. The children in this survey, although infected, showed little or no clinical manifestations, and all those old enough to walk were able to run about as if perfectly healthy, even when parasites were readily demonstrable. Of the four children who never showed parasites, two were only aged 9 months and 11 months respectively at the beginning of the survey. This varied resistance to infection of children below the age of 10 would seem to indicate that certain individuals have an inherited tolerance against infection, and possibly these to a large extent are the survivors who reach adult life.

The adult natives of Nyasaland, the majority of whom are infected, seldom suffer from clinical symptoms, although sometimes there is a failure of this relative tolerance. Probably the best example of such a breakdown is found during pregnancy. Thus, sixty native women were examined for the presence of blood parasites, and later, after the birth of the child, the blood from the maternal surface of the placenta was also subjected to examination. Smears from fourteen of the newly born children were taken with the object of detecting any cases of congenital infection. Despite the shock of childbirth most of the women remained absolutely immune to clinical malaria.

During the course of the pregnancies, only six of the sixty native women showed the presence of parasites in the peripheral blood when thin blood smears were examined. Four women had massive placental infections with all stages of *P. falciparum* up to and including mature schizonts, and only one showed rings of *P. falciparum* in the peripheral blood-stream before the birth of the child. Two women with parasites in the blood before the birth of the child showed only a few parasites in the placental smears. It would appear that this form of tolerance is not always absolute but is rather a matter of degree. One case was interesting, for although, so far as thin blood smears were concerned, the woman was free from parasites during pregnancy and examination of the placenta also gave a negative result, she, nevertheless, two days after the birth of the child, developed clinical malaria associated with the presence of asexual forms of *P. falciparum*. Many native women develop acute clinical malaria after childbirth.

Where European women are concerned, the danger of acute malaria with fatal coma or blackwater fever after childbirth must be considered even when, during pregnancy, there is no evidence of clinical malaria and blood-films remain consistently negative. This is so important that, as a routine, quinine should be administered before the birth of the child in order to avoid abortion and dangerous complications to the mother during the puerperium.

The blood-films from newly born infants were all negative. The question of the occurrence of congenital malaria is one of importance. There seems to be not much

doubt that congenital malaria, i.e. malaria contracted *in utero*, is a rarity and that despite the fact that Mackay (1933), Schwetz and Peel (1934), and Schwetz (1934) have reported positive cases. These positive babies had very few parasites, which is a very distinct contrast to the heavy maternal placental infections. On the other hand, Blacklock and Gordon (1925), Van den Branden (1927) and Lombart (1931) found no infections of newly born babies.

The Control of Infection by Phagocytosis : Phagocytosis in the Placenta.

It is a matter of the utmost difficulty to find any reason to account for the fact that there is no comparison between the intensity of the placental infections and the degree of parasitization of the corresponding peripheral blood. The phagocytic picture exhibited by these placental smears affords a remarkable demonstration of the active part played by the large mononuclear macrophages and the polymorphonuclear leucocytes as controlling factors, modifying the course of the infection. It has been shown (Thomson, 1933) that phagocytosis must play an important rôle as a bodily protection against the over-production of malarial parasites, though Yorke (1933) seems rather to hold the view that the reticulo-endothelial function may be that of a scavenger, clearing the blood-stream of *Plasmodia* previously damaged or rendered more easy prey to the phagocytes by hypothetical antibodies of some kind or another. Be that as it may, it is a most curious phenomenon how the placental polymorphonuclear leucocytes exhibit such a marked predilection for fully developed or nearly mature schizonts. The mechanism by which malarial parasites are destroyed has been discussed by Lowe (1934), who has reached the conclusion that it may take place by two methods: (1) by the lysis or phagocytosis of free merozoites, or (2) by the ingestion of infected red blood-corpuscles by the reticulo-endothelial system of cells. Both these processes operate from the beginning but, as time goes on, they are often augmented by a spontaneous disappearance of the parasites, with an accompanying respite from the fever.

Blackwater Fever in Nyasaland.

The analysis of sixty-seven cases of blackwater fever made by Shelley (1931), and referred to above, dealt with cases occurring during the years 1921 to 1931 inclusive. Of these, fifty were in Europeans and the balance of seventeen cases was in Asiatics. An examination of records of the disease in this territory from 1911 to 1933 inclusive shows that during this period of twenty-three years 157 cases of blackwater fever have been reported, with a death-rate of 30%. Last year (1933) there were eight cases. It is thus regrettably obvious that malaria is still far too common and intense amongst Europeans. Conditions in Nyasaland appear to be very similar to those existing in Southern Rhodesia: there is insufficient protection from repeated infections with malaria. Blackwater fever really seems to depend more on the mode of life of the individual himself, as these cases all tend to occur in zones or houses well outside the areas controlled by organized European communities. Such persons neither protect themselves from the onslaught of mosquitoes nor take quinine as it should be taken. It seems clear, however, that improvement has gradually taken place as a result of better housing conditions and general hygienic measures, for in an appendix to the Annual Medical Report of the Protectorate Sir Harry Johnston (1895) wrote that:—

"The death-rate amongst Europeans rose from the former death-rate of 6·5% to 9·7%. The number of deaths registered was 28 out of an average European population of 275. Of these deaths 20 were due to various forms of malarial fever (including blackwater fever). . . . Out of 20 deaths from malarial fever 16 were cases of blackwater fever. Besides these 16 cases there were as many more where recovery took place."

It seems, therefore, that in the year 1895 there were about 32 cases of blackwater fever in a population of only 275 Europeans.

The Prevention of Malaria and Blackwater Fever.

The control of malaria by sanitary engineering, drainage, oiling of pools, screened houses, and every known method of breaking the contact between anophelines and man, can be applied around townships and villages inhabited by Europeans. Throughout such vast territories as Nyasaland and Rhodesia, where malaria is hyperendemic and the population is widely scattered, it is not infrequently necessary to advocate most strongly the use of prophylactic quinine to those careless persons who will not defend themselves against the onslaughts of anophelines. For many years past all medical men, who have had personal experience under hyperendemic conditions, have unanimously agreed that, where living conditions amongst Europeans in blackwater-fever areas was such as to render protection from malaria an impossibility, a dose of 5 gr. of quinine should be taken with absolute regularity, at least for the duration of the malarial season. Attention has been drawn (Thomson, 1924) to the dangers of intermittent quinine-taking and to the fact that, to be efficient as a malarial and blackwater-fever prophylactic, the quinine dosage must be regular.

During 1934, Monseigneur Guillemé published his experiences of blackwater fever in the *Nyasaland Times*, and these observations by a most distinguished scholar are of the greatest interest and historical value. When the White Fathers began to establish Central African Missions (1878) the use of quinine was not known as it is now, and accordingly the Fathers only took a dose when they felt that they had a malarial attack or that one was impending. This method proved to be disastrous, for blackwater fever supervened and caused the deaths of more than 200 of the Fathers, whose graves are now spread around the Great Lakes of Central Africa from Nyasa to Victoria Nyanza. Bishop Guillemé considers that nearly all were the victims of a faulty method of taking quinine. This condition of affairs lasted for about twenty-seven years and then, instead of taking quinine as a remedy for malaria, the drug was utilized as a preventive. Five grains of quinine were taken daily, beginning on the day of the departure from Marseilles, and if any felt ill, tired, sickly, or out of sorts, the dose was doubled for a few days. The success of this method has been marvellous. There are now more than 600 White Fathers serving under these malarious conditions, and for the past twenty-eight years, since the adoption of the regular 5 gr. of quinine a day rule, not one single case of blackwater fever has occurred. This serves to emphasize once again that quinine prophylaxis should be carried out properly or not at all.

Conclusions.

(1) The two chief vectors of malaria in Nyasaland are *Anopheles gambiæ* and *A. funestus*. *A. gambiæ* is very scarce during the dry season, but appears in increasing numbers with the onset of the wet season; *A. funestus* adults are plentiful throughout the entire year, but their density also increases during the wet season.

(2) Epidemic malaria occurs during the wet season. Although *A. funestus* may be found in large numbers in houses during the dry season, it is probable that this mosquito is not actively engaged in the transmission of malaria. According to Leeson there are several biological races of *A. funestus*; the rôle played by these strains in the transmission of malaria requires further investigation.

(3) "Random sampling" of blood-films from native children only provides information limited to the particular time when the survey was carried out. Using this method, three cases of *P. ovale* infection were detected.

(4) A continuous survey of 103 children examined once a month for one year showed that 99 were infected and that four remained consistently negative. The children showed great variations as regards their susceptibility to infection. Some were refractory, some were moderately susceptible, while others were highly susceptible. *P. falciparum* predominated and was present in 96 of this group. Thirty-five of the children had *P. malariæ* and nine had *P. vivax*.

(5) Gametocytes were found on 101 occasions. Crescents of *P. falciparum* were present forty-seven times and gametocytes of *P. malariæ* occurred also on forty-seven occasions. Gametocytes of *P. vivax* were found on only nine occasions.

(6) Tolerance was most rapidly developed against *P. vivax*, and this was followed later by tolerance against quartan infections. *P. falciparum* persisted longer as age advanced, and would seem to be the most prevalent infection in adults.

(7) Resistance to *P. falciparum* in adults is frequently broken down, as was seen after childbirth in native and European women. An examination of the blood of the mother before the birth of the child may give no information regarding the presence of malaria, as is well demonstrated by examination of the maternal surface of the placenta. Abortions and stillbirths due to *P. falciparum* infections of the placenta are common, and acute clinical malaria in the mother may show rapid onset after the birth of the child.

(8) Phagocytosis of fully developed schizonts by polymorphonuclear leucocytes is an important method of controlling *P. falciparum*, as is well seen in placental smears. Parasites are also engulfed by the large mononuclear macrophages; these cells also swallow pigment and infected red blood-corpuscles. Infection of the unborn child is possibly rare.

(9) Blackwater fever occurs amongst Europeans and Asiatics. The use of quinine as a prophylactic against this condition is recommended. Unless this drug is used correctly it is dangerous and of no value as a prophylactic. Routine treatment of all pregnant cases before the birth of the child is necessary where malaria is suspected, even when the peripheral blood of the mother is negative.

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Discussion.—Sir RICKARD CHRISTOPHERS said that Professor Stephens and himself must have been the first malariologists to visit Nyasaland. With regard to vital statistics in the case of backward countries, he thought the most important objective to strive for was accurate registration of births and deaths. Diagnosis of cause of death could not be expected to be of much value. Scientific study of the total death curve, interpreted through dispensary and hospital returns and other available information, was helpful. As to the relation of the numbers of anophelines to malaria prevalence, he did not think that in this case there were sufficient data to support any theory. The facts required working out in relation to length of life, state of the ovaries, precipitin reaction, and modern methods of investigation. He was glad that Professor Thomson had stressed the fact that figures giving the parasite rate always implied some arbitrary standard of amount of blood examined in arriving at the results. The fact that certain children in Professor Thomson's series remained negative throughout the whole year in which they were under observation, seemed to point to these as actual negatives rather than as merely apparent negatives due to insufficient examination; and this would almost necessitate the view that they were natural immunes. As to prevention, great importance should be attached to blackwater fever, and it did not appear that, as yet, the great value of suitably screened houses, constructed in the first place with this object in view, had been fully appreciated in countries where blackwater fever prevailed.

Colonel S. P. JAMES congratulated Professor Thomson on the results of his application of "the new method of malaria survey" by which, instead of studying malaria among native races as a mass problem on results obtained by random sampling, one made a continuous clinical and parasitological study of selected individuals. He noted that one of Professor Thomson's findings by this method was that several of the 103 children whom he examined month by month had apparently escaped the disease entirely throughout their lives, and seemed to possess a natural resistance or immunity to infection. Adults with the same kind of resistance were sometimes found among patients for whom a course of malariatherapy had been prescribed, and great difficulty was experienced in giving them the required course of malaria fever. A patient sent to Horton for a course of malariatherapy in February 1934 was a good example. He was a West Indian negro who had passed most of his life in Europe and, so far as could be ascertained, had never suffered from malaria. As it was considered very desirable to give him the benefit of a complete malaria course, he was inoculated on different occasions between February 8 and July 5 with *P. vivax*, *P. falciparum*, *P. ovale*, *P. malariæ* and *P. knowlesii*. Some of the inoculations with *P. vivax* and *P. falciparum* were by the bites of infected mosquitoes as well as with blood. Among all these parasites the only one which caused an attack of fever was *P. ovale*, and this attack was mild and ended in recovery without treatment on the sixth day. Following the series of three inoculations with *P. malariæ*, which were given on different occasions towards the end of June, a few quartan parasites had appeared in the blood between August 3 and 7 and the temperature on one day rose to 101° F., but that was the only result. None of the other species caused any clinical or parasitic manifestation. Four separate attempts to infect the patient with *P. knowlesii* had all been without result. This seemed to indicate that the patient possessed a natural resistance to malaria in general, for *P. knowlesii* is a species against which he could have had no opportunity of acquiring immunity by natural infection.

Sir MALCOLM WATSON said that the study of the Anopheles would be the foundation of the sanitary work which would make Africa healthy, and at the same time provide it with food. Work done in any one country was almost certain to throw light on the problems of other countries.

There was no proof that malaria was a social disease like tuberculosis, any more than syphilis and yellow fever were social diseases. The highest-class American and the best-housed and best-fed officials were those who suffered most from yellow fever. The same was seen in other countries. On the Congo mines the natives were well fed, well housed, and well looked after, nevertheless, as Dr. Van Nitsen had pointed out, malaria accounted for 50% of the sickness there. On the Roan Antelope Copper Mines, where mosquitoes were controlled, malaria among the African labourers was not of any economic importance. The assertion that malaria was a social disease merely obscured the problem.

Section for the Study of Disease in Children

President—R. C. JEWESBURY, D.M.

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Supravital Staining in the Diagnosis of the Leukæmias

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IN the leukæmias of childhood it is commonly held that nearly all cases can be placed in the group "lymphatic leukæmia," and that exceptions are rare. When such exceptions occur their diagnosis is not always readily made. At the Hospital for Sick Children, Great Ormond Street, it happens that we are employing supravital methods in connexion with other work, so that blood from cases of leukæmia can be similarly examined whenever opportunity arises.

In the last six months, seven cases of leukæmia have been so examined. Of these, four were lymphocytic, one monocytic, and two myelogenous in type. The supravital method has been of value in confirming the diagnosis in the four cases of lymphatic leukæmia; it has pointed the way to a correct diagnosis in the case of monocytic leukæmia; while in the myelogenous cases it was of material assistance.

Technique.—Several papers include details of supravital technique (Simpson, 1922, Sabin, 1923, Cappell, 1929), which it is unnecessary to repeat. The principle of the method is to examine the cells before fixation and when alive, so that their motility, true shape and physiological activity may be studied. By this method correct differentiation depends on observation of the cell-outline at rest and in motion, and the method of cell-progression. Furthermore, granules stainable after fixation by the ordinary blood-stains are also made visible by neutral red supravitally; in addition, the mitochrondria are specifically stained by janus green and the vacuolar apparatus takes up neutral red. It is an underlying principle of the technique that these stains are used in a concentration too weak to stain the cytoplasm or affect the nucleus, thus avoiding death of the cell. Preparations are examined at 37° C. within an hour or so of collection. We, as others, have made routine use of neutral red and janus green, and for the most part have followed the technical methods described by Sabin (1923). A useful introduction to the supravital study of normal blood-cells is also to be found in the descriptions of Cunningham and Tompkins (1930). We obtain samples of blood at the bedside, applying specially cleaned cover slips to a freely flowing finger-prick. The drop obtained on the cover slip is applied without pressure to a carefully cleaned and previously

stained dry slide. The method of preparation of these slides consists in special cleaning (Sabin, 1923) followed by "surfacing" with a mixture of neutral red and janus green in alcoholic solution. Each slide is dipped separately into freshly prepared alcoholic stain, and then allowed to stand in vertical position until evaporation is complete. By this means an even spread is obtained, a point of technical importance, and one suggested to us by Professor R. A. Webb. The cover slips are suitably sealed in position on the slides, which are placed in an incubator for from fifteen to thirty minutes before examination. If a patient is at a distance we carry the preparations back to the laboratory in a special thermostatic container of our own design. For the actual examination an electrically heated, asbestos-lined box, of design similar to that used by Dr. R. A. Hickling, encloses our microscope. Mr. George Gurr has been kind enough to advise us as to the preparation and concentration of the stains. Stock solutions at the following concentrations appear to keep almost indefinitely: (1) 0·25% Gurr's vital neutral red (chloride); (2) 0·4% Gurr's vital janus green B separately in redistilled absolute ethyl alcohol. For the staining of the slides shortly before use, 1·75 c.c. of the stock neutral red solution and 0·07 c.c. of the stock janus green are added to 10 c.c. of redistilled absolute ethyl alcohol. A dilution of this order is suitable for blood containing 20,000 to 30,000 leucocytes per c.mm. For the study of tissue, such as marrow, and for leukæmic blood containing up to 100,000 white cells, it is advisable to double the concentration of each of the dyes, the amount of the stain available for absorption by the cells being kept roughly in proportion to their number.

Case Reports.

I.—*Lymphatic Leukæmia.*

(1) E. P., female, aged 4½ years. Admitted with pallor; no other physical signs. Blood-examination: R.B.C. 1,200,000; Hb. 22%; W.B.C. 3,600; polys. 11%: lymphocytes 82%; monos. 7%. Diagnosed as aleukæmic leukæmia. After six weeks, following a blood transfusion, an almost complete remission occurred, so that diagnosis was questioned and the patient sent home. After six weeks she was readmitted with Mikulicz's syndrome, and the blood-count was normal. From this time her anæmia gradually returned; liver, spleen and lymph-glands enlarged, and the blood-picture became that of lymphocytic leukæmia. Before death, a month after readmission, the W.B.C. reached 27,700, with 98·5% lymphocytes. Autopsy: lymphatic leukæmia.

(2) I. L., male, aged 6 years. History of pallor. General enlargement of lymph-glands, spleen and liver. Blood examination on admission: R.B.C. 3,200,000; Hb. 60%; W.B.C. 97,000 with 92% lymphocytes. In hospital there was rapid deterioration; final W.B.C. count 145,000. Autopsy: lymphatic leukæmia.

(3) R. W., female, aged 8 years. History of anæmia, enlarged lymphatic glands and proptosis for eight months. Roentgen treatment three months after onset, with improvement, the blood-picture at the time being suggestive but not typical of leukæmia. On admission: enlarged lymphatic glands and spleen. Blood-examination: R.B.C. 3,950,000; Hb. 50%; W.B.C. 82,000; polys. 1%; lymphocytes 98%; monos. 1%. Of leucocytes 98% were oxydase-negative. No autopsy was allowed in this case.

(4) E. N., male, aged 3½ years. History; pallor and petechiæ with retinal hæmorrhages. Liver, spleen, and lymphatic glands enlarged. Blood examination: R.B.C. 1,600,000; Hb. 28%; W.B.C. 70,000 with 99·5% lymphocytes. Rapid course. Autopsy: lymphocytic leukæmia.

In each of these four cases supravital staining confirmed the predominant cells to be lymphocytes and lymphoblasts.

II.—*Monocytic Leukæmia.*

R. W., male, aged 10 years. Three months increasing pallor. No other physical signs. Blood examination: R.B.C. 3,200,000; Hb. 52%; W.B.C. 10,000; polys. 5·5%; lymphocytes 25·5%; the other cells were of doubtful type. The presence of Auer's bodies[1] in some of the cells made it appear possible that the abnormal cells were myeloblasts, yet supravital staining revealed that these were monocytes and promonocytes. A series of 15 blood-counts accompanied by supravital studies left no doubt as to the diagnosis of monocytic leukæmia. Biopsy on the marrow, and later a full autopsy, confirmed this.

III.—*Cases of Chloroma with Myelogenous Leukæmia.*
(*Shown before this Section.*)

(1) S. G., female, aged 1 year and 9 months. First seen 6.11.34, suffering from recurrent swelling of the limbs in the vicinity of the joints.

History.—Normal birth. Birth-weight 6 lb. Breast fed for ten months, then light varied diet. She was well till three months ago, when her arms and legs became swollen in the neighbourhood of the joints; they were hot and painful, and she screamed on movement. Since then there have been recurrent attacks, and the child has wasted and become pale.

Condition on examination.—Fretful; pale, yellowish-tinted skin. Bones at elbows and knees swollen and tender. Pulse 100. Mild pyrexia. Heart: nothing abnormal discovered. Lungs: scattered râles. Mouth healthy. Glands enlarged in neck, axillæ, and groins. Liver enlarged three fingerbreadths below lower border of ribs; spleen enlarged two and a half fingerbreadths.

X-ray report (Dr. B. Shires, 7.11.34).—"Slight general decalcification with irregular absorption of cortical bone, especially in diaphyses. Elevated periosteum and irregular periosteal new bone along shafts. In the lower ends of the femora the new bone is spiculated—simulating a periosteal sarcoma. Appearance of an advanced leukæmia."

Blood examination (7.11.34).—Hb. (Haldane's method) 32%. R.B.C. 1,100,000 per c.mm. W.B.C. 58,000 per c.mm. Myeloblasts 6%; premyelocytes 32·5%; myelos. 17%; metamyelos. 4%; polys. 12%; large lymphos. 4%; small lymphos. 20·5%; monos. 3%; basos. 1% (Leishman's stain).

The immature cells contained rather azurophil granules, varying from a few small ones in the premyelocytes to more numerous large ones in the maturer myelocytes. The oxydase stain showed about 80% of cells to be oxydase-positive. There were also five normoblasts per 100 c.c., and one megaloblast per 200 c.c. Supravital staining confirmed the type of cell observed on the fixed smears.

Shortly before death two small raised nodes were felt in the patient's calvarium. Death occurred on 24.11.34. At autopsy, widespread chloromatous deposits were found, affecting principally the skull, thorax, spine and pelvis.

(2) D. B., male, aged 1 year, previously healthy, admitted to Westminster Hospital with the following history:—

Six weeks previously lost his appetite, ceased to walk or to move his legs, and screamed if his legs were handled. Soon afterwards the arms also became tender, and then swelling appeared over the lower part of the legs, with shininess of the skin in that region. On subsequent days the degree of the swelling varied. Bilateral orbital swelling appeared a week before admission.

Condition on examination.—Pale, ill, fretful and febrile. Respirations rapid. Tongue furred, superficial ulceration of tongue, gums and palate. Swelling of orbital tissue, especially on right side; some proptosis; no green-coloration of the swellings; discs normal. Attached to bone in the fronto-parietal region, some firm

[1] A note on the occurrence of Auer's bodies in monocytic leukæmia will be published in the *Journal of Pathology and Bacteriology*, March, 1935.

nodules were found; these have diminished in size. Enlarged lymphatic glands in axillæ and groins. Spleen not palpable.

Legs: Induration and swelling of deep tissue in neighbourhood of lower ends of tibiæ and femora, with overlying shiny skin; bones tender. Soon after admission a few lead-coloured plaques appeared in the skin of abdomen and chest.

Investigations.—Radiographic: The bones showed (1) rarefaction, especially at the ends of the humeri, and long bones of forearm and leg; (2) erosions of the corticalis, particularly of metaphyses of tibiæ, femora, radii; (3) extensive periosteal elevation of tibiæ, femora, and long bones of arms. Shaft of left radius grossly decalcified with cystic area visible.

Wassermann and Kahn reactions (of mother and patient) negative. Bleeding time 5½ minutes. Platelet count on 6.10.34, 390,000 per c.mm. No improvement followed administration of orange juice.

Blood-count (Dr. R. J. V. Pulvertaft, 8.11.34): R.B.C. 3,230,000 per c.mm.; Hb. 52%; C.I. 0·8. W.B.C. 7,000 per c.mm. Polys. 15%; lymphos. 75%; monos. 1%; eosinos. 6%; basos. 1%; myelocytes 2%. Nucleated red cells 70 per c.mm.

Course.—The leucocyte count has varied from 7,000 per c.mm. to 33,600 per c.mm., and the percentage of lymphocytes from 75% to 89%. The swelling of the legs has diminished, and the skin-shininess disappeared. The orbital swellings have increased, and chemosis has appeared in the right conjunctiva. The degree of the anæmia deepened, and on November 11 a blood transfusion was given. Forty-eight hours after this the levels of both red and white cells were found to be moderately increased, and a higher polymorph percentage (28%) was obtained. The fever has continued throughout. Gradually the clinical appearance has become that of chloroma.

Postscript.—Subsequently, numbers of micromyeloblasts and some myelocytes appeared in the blood, though lymphocytes continued to predominate. A biopsy on the sternal bone-marrow showed great numbers of myeloblasts and myelocytes replacing the normal marrow cells. At autopsy the diagnosis of chloroma was confirmed by the finding of green-coloured leukæmic deposits in the long bones and under the periosteum, and in certain lymphatic glands, the skull and orbits.

Summary

Though it must be stated that the supravital method requires special training and apparatus, and takes up more time than the older methods, this study of leukæmia repays the trouble, especially in rare and anomalous cases. The method has been of most value in distinguishing lymphocytes from monocytes. By the ordinary staining methods young monocytes are notoriously difficult to differentiate from lymphocytes, yet supravitally their features are sufficiently distinct to enable a ready recognition of nearly every such cell. It follows that most help is to be expected in the diagnosis of monocytic leukæmia, and this has been our experience. It has also helped us in the investigation of other cases, and may be looked to as an aid in distinguishing myeloblastic from acute lymphatic leukæmia, though the oxydase reaction must not be omitted.

[We are indebted to the Honorary Staff of the Hospital for Sick Children for allowing us access to their cases, to Dr. David Nabarro as Director of the Pathological Department, to Professor R. A. Webb and Dr. R. A. Hickling for advice, and to the Medical Research Council and the Thomas Smythe Hughes Medical Research Fund for expenses' grants.]

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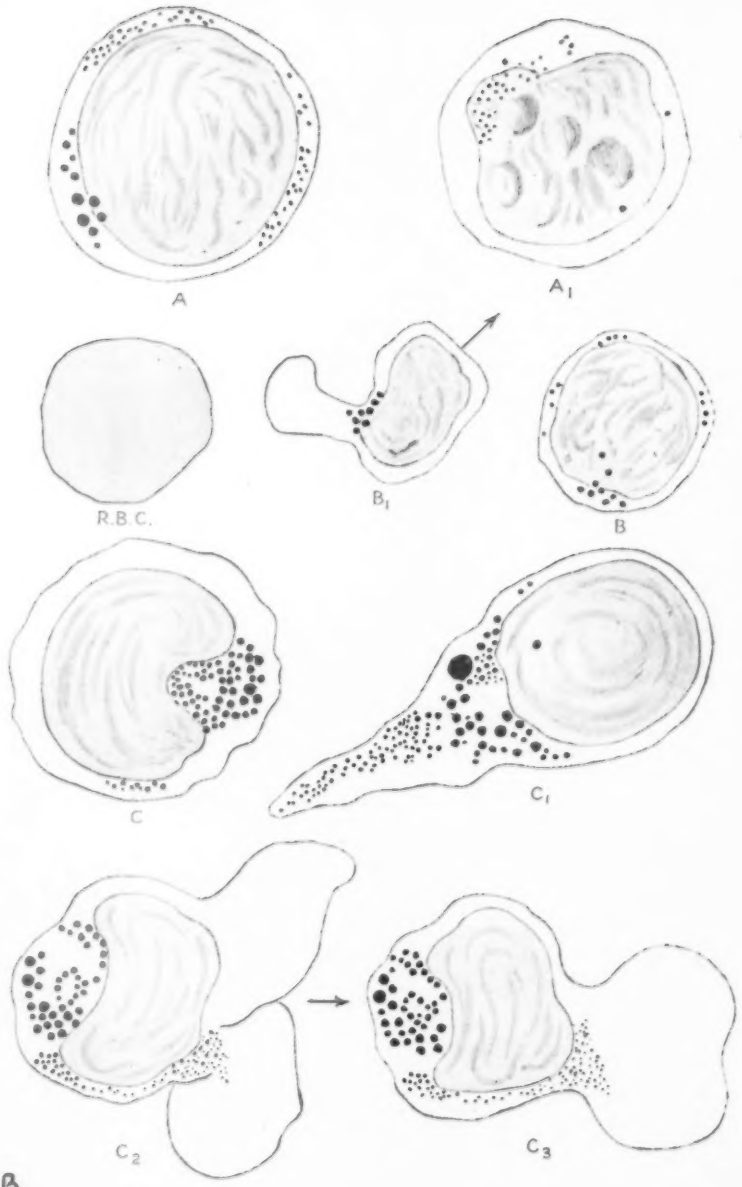

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LIGHTWOOD, HAWKSLEY, and BAILEY : Supravital Staining in the Diagnosis of the Leukæmias.

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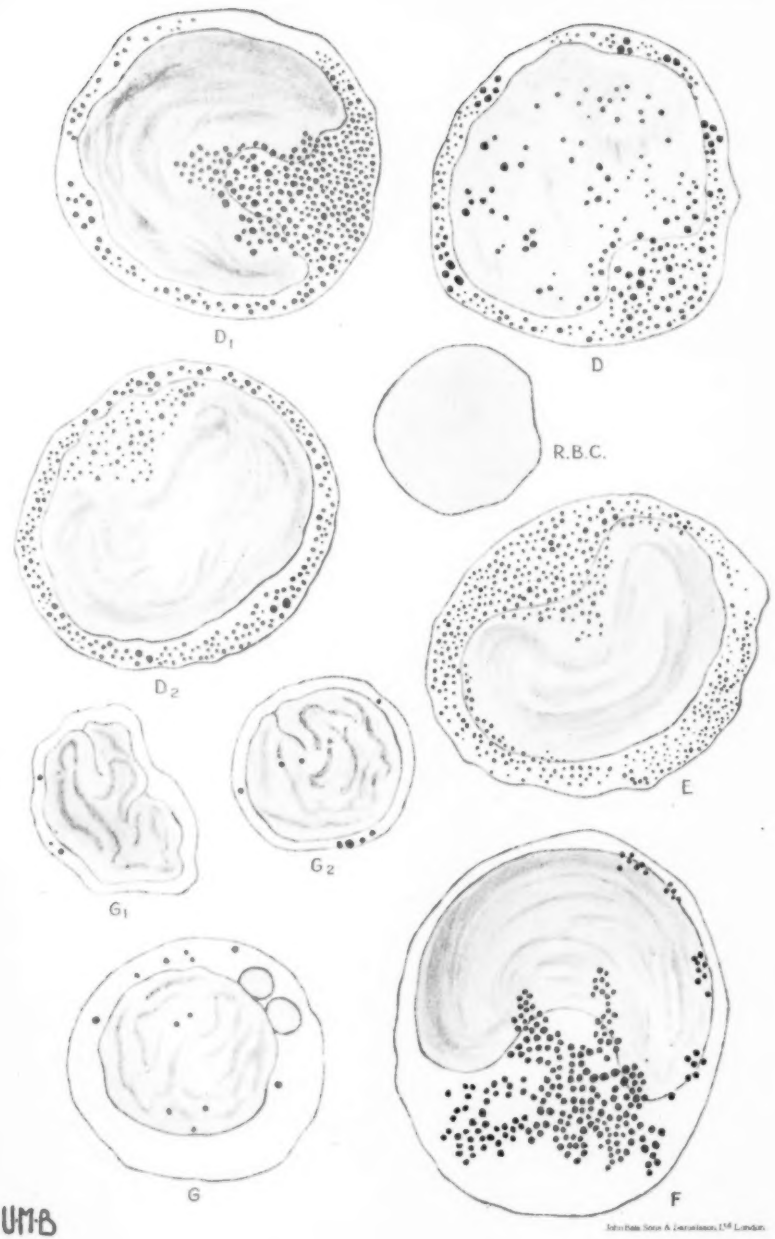

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LIGHTWOOD, HAWKSLEY, and BAILEY: Supravital Staining in the Diagnosis of the Leukæmias

UNIV. OF MICH.

EXPLANATION OF COLOURED PLATES.

Lymphatic Leukæmia.

A Large lymphocyte seen in lymphocytic leukæmia (Case 8, R. W.). Narrow rim of cytoplasm surrounding centric, spherical nucleus. Neutral red vacuoles larger and more numerous than is normal, also excess of rod-shaped mitochondria (blue).

A_1 Large lymphocyte (Case 4, E. N.). Note heavy strands of chromatin in nucleus, and presence of nucleoli.

B Small lymphocyte (Case 1, E. P.). Small groups of vacuoles (red) and the mitochondria (blue) are usual in this cell both normally and in these leukæmias.

B_1 Small lymphocyte (Case 2, I. L.) showing movement in direction of arrow, with nucleus in advance. No mitochondria in this cell.

Monocytic Leukæmia.

C Monocyte (R. W.) closely resembling those seen in normal blood. Vacuoles (red) grouped in the form of a large rosette in the "hof" of the nucleus. A few mitochondria (blue) are present.

C_1 Monocyte from same case drawn during amœboid movement; unlike the lymphocyte, the nucleus does not precede.

C_2 and C_3 Two stages in the movement of another monocyte.

Myelogenous Leukæmia.

D and D_1 Two types of mature myelocytes (Case 1, S. G.) Large nucleus becoming indented with increasing maturity. Cytoplasm filled with neutral red granules. Mitochondria were absent in these cells.

D_2 A young myelocyte (same case). The nucleus less mature; fewer neutral red granules than in D and D_1. Mitochondria present.

E Myelocyte, typical of Case 2 (D. B.).

F Monocytoid cell (Case 2, D. B.), one of several of this type observed.

G Large lymphocyte (Case 2, D. B.), in this instance showing clear vacuoles adjacent to nucleus.

G_1 and G_2 Small lymphocytes, same case, showing folding of the nucleus, not often seen except in leukæmia.

Still's Disease Cured by Gold.—W. S. C. COPEMAN, M.R.C.P.

Harold B., aged 12 years. "Rheumatoid arthritis" since infancy. Admitted to Cheyne Hospital, November 10, 1933. Swelling, limitation of movement and pain in wrist and fingers. Stiffening in both shoulders and limited rotation. Feet and ankles very stiff and swollen. Genu valgus (both knees) with limited range of flexion and extension. Spleen just palpable.

Radiological report (Mr. R. L. Rawlinson).—Left shoulder: Irregularity of glenoid and head of humerus. The structure of the bone appears to be coarser than normal. Wrists and hands: Considerable deformity of the carpal bones, with narrowing of the joint spaces; deformity of the lower epiphyses of the radius and ulna. Coarse striation of the bones; thickening of the joint capsules. Knees: Thickening of the soft tissues; alteration of bone structures. Ankles: Narrowing of the joint spaces; peri-articular thickening; alteration of the bone structure. Right foot: Some pes cavus; narrowing of the joint spaces; irregularity of the tarsal bones; alteration of bone structure.

Wassermann reaction negative; tuberculin test faintly positive.

Sedimentation test: first hour 26; second hour 52.

Given four injections of 0·05 gramme allochrysine at weekly intervals.

January 19, 1934. Sedimentation test: first hour 16; second hour 42.

March 22, 1934. „ „ „ „ 12; „ „ 34.

March 22, 1934. Comfortable, no pain. Hands no longer clammy; no loss of power. Made good progress until July 27 when he was sent away for eight weeks. Returned to hospital September 18; report very good; free movement of joints. Has since been given three further injections of allochrysine of 0·01 gramme. Fingers still fusiform, but there seems to be little other limitation of any sort. General health excellent. Spleen not felt.

October 24, 1934. Sedimentation test: first hour 6; second hour 10. Blood uric acid, 2·66 mgm. per 100 c.c.

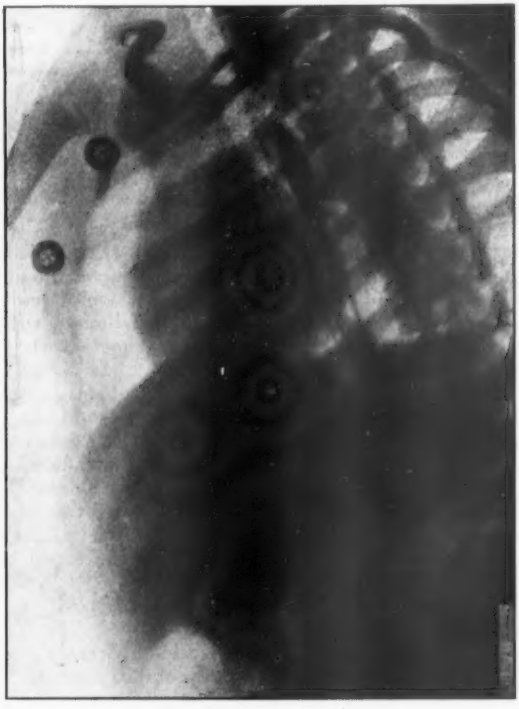
Dr. F. J. POYNTON said that the Section was no doubt aware that at present in more senses than one there was a gold boom, but one could not afford to lose sight of the fact that in France much success had been claimed for this treatment, which was largely due to the work of Forestier. One had to realize that there were dangers, both immediate and remote, about it. He was obliged to submit that the statistics about the various treatments of this disease showed that nearly every method gave the same percentages of successes in the hands of its advocates. He thought the Section was indebted to Dr. Copeman for bringing this case before them.

Congenital Œsophageal Stricture.—W. M. FELDMAN, M.D., B.S.

R. J., a boy, aged 1 year and 10 months.

History.—Vomiting since birth, more marked when put on semi-solid diet. Does not gain weight normally. Can take large quantities of oatmeal porridge without vomiting.

Examination.—No abnormal physical signs anywhere. Wassermann reaction negative. Barium X-ray examination shows partial obstruction at level of seventh dorsal vertebra.



Congenital œsophageal stricture.

Treatment.—Fed on soft food. Atropine gr. $\frac{1}{100}$ t.d.s, given, without any improvement resulting. Bougies failed to pass the obstruction.

Achalasia of the Œsophagus.—K. H. TALLERMAN, M.D.

F. R., a girl, aged 8½ years, was first seen in May 1934, with complaint of persistent vomiting since the age of 6 weeks.

Family history.—One brother died at the age of 4 weeks, "owing to vomiting" (? pyloric stenosis); nothing significant otherwise.

Previous history.—Apart from certain exanthemata, the only illness known is an attack of acute rheumatism at the age of 4½ years; since then there have been frequent pains in the limbs. There is a further history of recurrent sore throat and cervical adenitis. She was a normal, full-term infant, artificially fed.

History.—At the age of 6 weeks she began to vomit, and since this time never more than three or four days have passed without vomiting. This would occur at meal times, sometimes as often as six times during a meal; she would rush from the table, but might vomit before she could reach a place of safety. It would happen only while food was being taken, never between meals, and was worse with solids than with liquids. She would never vomit partly digested food. Vomiting was painless, without retching, and caused only transient distress. On questioning, she said: "Something seems to stop food in my chest, and then suddenly it seems to slip through," and added that she could feel fluid "drip, drip, dripping through."

She often had temporary improvement after new treatment or a change of circumstances. Vomiting was always less if she were kept in bed, and once when in hospital she vomited hardly at all.

The appetite was very good, and the bowels were regular.

On examination, May 1934.—The child was found to be well developed, and not wasted; weight 44¾ lb. She was bright and intelligent, though somewhat nervous. Apart from an error of refraction, corrected by glasses, there were no significant physical signs, though the tip of the spleen and left kidney were palpable. Heart and lungs normal; no retrosternal dullness; throat normal; cervical glands palpable.

X-ray examination (Dr. C. Hilliard), 23.5.34.—"Barium cream passed without obstruction to the lower end of the œsophagus, where it was held up by spasm just above the diaphragm. The whole of the œsophagus was filled up before any barium passed into the stomach. Occasional peristaltic and reverse peristaltic movements were seen, but the muscular contractions were feeble. The upper level of the column of fluid in the œsophagus could be seen rising and falling. The œsophagus appeared to be but little dilated. The case appears to be one of achalasia or pure cardiospasm."

Treatment.—The child, who was admitted to hospital, was gradually taught to swallow a rubber stomach tube, and when her nervousness had been overcome an 18-gauge mercury-filled tube was substituted. For a short time she swallowed this three times daily before meals, keeping it down easily for about five minutes. Then she swallowed it twice daily, and was discharged after five weeks in hospital with instructions to do this once daily.

Progress.—During her stay in hospital (five weeks) she vomited only four times, and gained 3¼ lb. in weight (48 lb. on discharge). On 25.6.34, X-ray examination showed improvement.

Shortly after discharge she ceased swallowing the tube regularly, and only did so on the day following any occurrence of vomiting.

Her improvement in regard to vomiting has, on the whole, been maintained to the present, although recently she has been vomiting more than she did three or four months ago. Her condition is now very different from what it was before she came to hospital. Her weight is 50½ lb., a gain of 5¾ lb. in six months.

X-ray examination, 8.11.34: "First mouthful of barium passed through cardiac orifice without any delay. The next few mouthfuls were held up until the column of fluid reached the level of the aortic arch. Since last examined there is definite improvement; there is less œsophageal dilatation and less delay in emptying. The œsophagus is almost empty in half an hour."

Facial Tumour: Case for Diagnosis.—R. H. BAILEY, L.R.C.P., M.R.C.S., (for DONALD PATERSON, M.D.).

E. O., female, aged 11 years.

October 28, 1934 : Painless swelling left side of face for from three to four months. Now getting bigger.

History.—One year ago she banged her head against that of another girl. Painful at the time. Towards the end of July 1934, mother noticed swelling on left side of face. Local doctor thought it might be due to sting. No sign of subsiding. Mother says child has altered in disposition during this time, having become listless and unsociable.

On examination.—Mentally alert. Hard mass felt and seen over zygomatic process of malar bone on the left side ; smooth, firm and fixed. No tenderness or redness. No pain on movement of jaw. No glands to be felt in the neck. No abnormality of cranial nerves, or of deep reflexes. On examination of the discs papillœdema was observed on both sides ; more marked on the left.

Investigations.—Blood-counts : 6.11.34 :—R.B.C. 5,090,000 ; Hb. 40% ; W.B.C. 6,000. *Differential :* Polys. 65% ; lymphos. 30% ; monos. 5%.

13.11.34 :—R.B.C. 5,500,000 ; Hb. 60% ; W.B.C. 10,000. *Differential :* Polys. 67% ; lymphos. 30% ; monos. 3%. No premature red cells seen.

Lumbar puncture : Clear fluid under slightly increased pressure. Protein 0·015%. Cells : none seen. Globulin : Nonne-Apelt negative ; Pandy's test negative ; Wassermann reaction negative. Wassermann reaction (blood) : negative. Mantoux test, negative.

Ophthalmic surgeon's report (Mr. A. F. MacCallan).—Right disc : margin blurred and striated above ; left disc : papillœdema, swelling between one or two dioptres, on revision measured at one dioptre. Vision : $\frac{6}{6}$ both eyes.

Dental skiagram : no abnormality.

Skiagram of skull : no bony abnormality.

Discussion.—Dr. F. J. POYNTON said that, in his opinion, three months at the seaside under supervision of an experienced doctor would be the best step at the present moment. He laid stress upon the importance of careful supervision.

Dr. H. L. TIDY called attention to the high degree of anæmia, and suggested that the swelling might be a Ewing's tumour.

Addendum.—Since this child was shown at the clinical meeting of the Section, an exploratory operation has been performed on the mass over the zygoma by Mr. Rock Carling.

Operation note.—A small cyst was found which welled up as the temporalis fascia was incised. It contained a thick red fluid. The bone of the zygoma appeared normal.

Examination of pus and contents of cavity.—No organisms seen in direct smear. No growth on blood or serum agar in twenty-four hours.

Tissue.—Granulation tissue rich in plasma cells suggests subacute infection following trauma. No evidence of neoplasm or tuberculosis.

Infant with Four Different Types of Congenital Deformities.—DENIS BROWNE, F.R.C.S.

This female infant, aged 4 months, shows the following deformities :—

(1) Achondroplasia.
(2) Club feet, " congenital fracture of tibiæ," and bending of thumbs.
(3) Arthrogryposis of fingers.
(4) Failure of fusion of palate.

The photographs show the condition of the feet before splinting (see p. 27).

FIG. 1.—Showing typical achondroplasic shortening of lower limbs

FIG. 2.—Showing "talipes equino-varus" deformity of feet.

Recurrent Swelling of Parotid Gland.—BRUCE PEARSON, D.M. (for ALAN MONCRIEFF, M.D.).

J. P., a boy, aged 6 years. Swelling of parotid glands first occurred at age of 1 year and 8 months, and has recurred at frequent intervals since. It is more noticeable when his general condition is poor, or when he gets any infection. The swelling occurs most markedly during breakfast, and causes him to terminate his meal prematurely. The condition lasts from one to two hours.

Sialogram shows terminal dilatation of parotid ducts, bilateral. No evidence of stone.

Secretion of parotid usually clear, but on one occasion opalescent fluid containing pus cells was obtained from right duct. Mantoux test: negative.

Blood-count during swelling.—W.B.C. 20,000; polys. 45%; eosinos. 5%; lymphos. 50%.

No family history or personal history of allergy. Sister, aged 26, has had similar recurrent swellings of both parotids since age of 3. Her sialogram also shows terminal dilatation. There is no previous record of recurrent parotid swellings occurring in siblings.

Recurrent Swelling of Parotid Gland.—BRUCE PEARSON, D.M. (for WILFRID SHELDON, M.D.).

C. P., a boy, aged 6 years. Swelling of parotid gland since age of 1 year and 10 months. This occurs about every three months. It is more marked in the summer and usually coincides with an attack of papular urticaria. The swelling lasts from one to two days and is more prominent on the right side than the left.

Sialogram shows terminal dilatation of ducts of both sides. No evidence of stone. Secretion of parotid: clear fluid. Mantoux test: negative.

Blood-count (swelling subsided).—W.B.C. 7,100; polys. 55%; eosinos. 9%; monos. 2%; lymphos. 34%.

Family history.—Grandfather has asthma.

Personal history.—Used to have frequent bilious attacks.

Dr. F. J. POYNTON said that he himself had had one attack of sudden swelling of this kind; it came on immediately after a meal. The sensation was that of secretion pouring into the left parotid gland with a violent rush, and the sense of tension was distressing. It soon passed off and had never recurred. He had lately seen another equally mysterious case in a doctor, X-rays revealing no calculus; he had been treated with belladonna and got well in about three days. He (Dr. Poynton) advocated massage of the gland. The diagnosis from mumps was of practical importance, and personally he thought worry and overwork were factors in the causation.

Specimen from Case of Spontaneous Pneumothorax, Pyopericardium and Liver Abscess Secondary to Abscesses of Lung.—R. W. B. ELLIS, M.D. (by permission of W. J. PEARSON, D.S.O., M.C., D.M.).

Boy, aged 3 years.

Clinical history.—Patient was well until February 1934, when he had measles followed by a cough. On June 27, 1934, he was admitted to hospital with ten days' history of drowsiness and refusal of food. The abdomen had become enlarged, and the right eye swollen. There had been considerable dyspnœa for three or four days.

Condition on admission.—An extremely ill, dyspnœic child, with swelling and ecchymosis of the right lower eyelid, and œdema of legs and sacrum. Temperature 103° F.; pulse 140; respiration 48. Percussion note dull over sternum and whole of left chest to second rib above, cardiac dullness being indistinguishable from lung dullness. The right chest was hyperresonant in the mid-axillary line. Fine moist râles were heard over both sides of the chest, but sounded distant on the right. Cardiac sounds muffled; apex beat not determined. The abdomen was distended. The liver could be felt 1½ in. below the costal margin, with a firm mass attached to

the left lobe, filling the left hypochondrium. The urine contained no albumin or blood.

Blood-count (28.6.34).—R.B.C. 3,760,000; Hb. 65%; W.B.C. 40,700. Polys. 85%; lymphos. 13%; monos. 1%; plasma cells 1%. Megaloblasts 1 per 100 W.B.C.; normoblasts 4 per 100 W.B.C.

Skiagram of chest (28.6.34) showed great enlargement of the pericardial sac, and a small right-sided pneumothorax.

Course.—The child became rapidly more dyspnœic, and a number of pustules developed on the trunk and limbs. Death occurred four days after admission.

Summary of post-mortem findings (examination of head not allowed).—On opening the thorax, there was an escape of air from the right pleural cavity. The pericardium was adherent to the sternum, the left lung, and the parietal pleura in the left mid-axillary line. It was greatly enlarged, and extended from one inch to

Pyopericardium and right-sided pneumothorax.

the right of the sternum to the left mid-axillary line, and to the level of the second rib above; when it was opened, from 60 c.c. to 100 c.c. of turbid, pinkish-brown fluid escaped. The lining of the sac was covered with thick, shaggy exudate. The left lung was displaced backward by the pericardium, and the right lung partially collapsed. The greater part of the left lung showed evidence of unresolved pneumonia, and the lower lobe was occupied by an abscess the size of a pigeon's egg, with necrotic walls, containing thick brownish-green pus. A pyæmic abscess 4 mm. in diameter, situated at the base of the right lower lobe, had ruptured through a small opening into the pleural cavity. Thick lymph was adherent to the lower margin of the right lower lobe. Several pin-head areas of necrosis and abscess formation were seen over the surface of both lower lobes. The liver was enlarged and the left lobe purplish in colour, and firmly adherent to the diaphragm, splenic flexure, and adjacent omentum. An abscess the size of a blackbird's egg, containing thick green pus, was situated anteriorly in the

left lobe. A number of smaller loculations extended from the main cavity. There was a collection of pus communicating with the abscess cavity, but shut off from the peritoneal cavity by adhesions between the liver, omentum, and splenic flexure, with localized peritonitis in this area. The spleen was enlarged, soft, and diffluent. There was a pale infarcted area, 1 cm. in diameter, at the upper pole of the right kidney, surrounded by a number of small pyæmic abscesses.

Cultures of pus from pericardial sac, abscess of liver, lung, and peritoneum grew *Staphylococcus aureus* in each instance.

Comment.—The specimen was shown owing to the extreme rarity of liver abscess in childhood, and as an illustration of one cause of spontaneous (non-tuberculous) pneumothorax. The infection appeared to have been a virulent one, which had spread from the lung to the pericardium and liver, and had resulted in a pneumothorax from the rupture of a small lung abscess.

Section of Surgery

President—PHILIP TURNER, M.S.

[*December 5*, 1934]

Loose Bodies removed from a Bursa.—DUNCAN FITZWILLIAMS, C.M.G., F.R.C.S.

Mrs. I. C., aged 30, admitted to St. Mary's Hospital 15.10.34.

History.—About two years before, a swelling had suddenly appeared on the left shoulder, which had previously been very painful. Since that time swelling had gradually become larger.

On June 19, 1934, an X-ray report was as follows: "An irregular shadow over the great tuberosity of the humerus. This may not be in bone continuity with humerus but calcification in the bursa."

A second skiagram was taken on September 24, 1934, and an exostosis of the humerus was suspected.

The patient had been treated for arthritis in the Rheumatism Clinic since 1928, on account of pains in the other joints.

Condition on examination.—There was a large swelling of the left shoulder. It was lax when the arm hung loosely but hard when the arm was abducted. On palpation it fluctuated and seemed to be full of mobile, loose bodies. There was rheumatoid arthritis in the hands, fingers and wrists.

On September 19 the cyst, which was full of loose bodies of cartilaginous consistence, was removed by operation.

Pathological report.—"The cyst consists of a fibrous wall lined by granulation tissue infiltrated with plasma cells and lymphocytes. On its wall are numerous small polypi also formed of granulation tissue. These polypi evidently become strangulated and fall off. They are then coated with fibrin and form the loose bodies of the cyst."

[Half a pint of loose bodies, the size of marbles, was shown.]

Squamous-celled Carcinoma of the Gall-bladder.—DUNCAN FITZWILLIAMS, C.M.G., F.R.C.S.

Colonel G. G., aged 73, January 1934.

For many months he had suffered from heart-block. He had been treated for some months with diet and complete rest and had improved considerably. There was a good deal of precordial and abdominal pain, and also some osteo-arthritic pains in the back. He was suddenly seized with acute abdominal pain radiating round his right scapula, and vomited several times. The pain required morphia for its relief. He was a tall thin man, and on examination a large and tender gall-bladder could be felt. He had never had any jaundice.

X-ray report.—"The gall-bladder does not fill and is presumably pathological. No abnormal shadows are seen. There are arthritic changes in the spine."

Operation.—The abdomen was opened by an oblique incision, and a large thick-walled gall-bladder, which contained 87 stones, was removed.

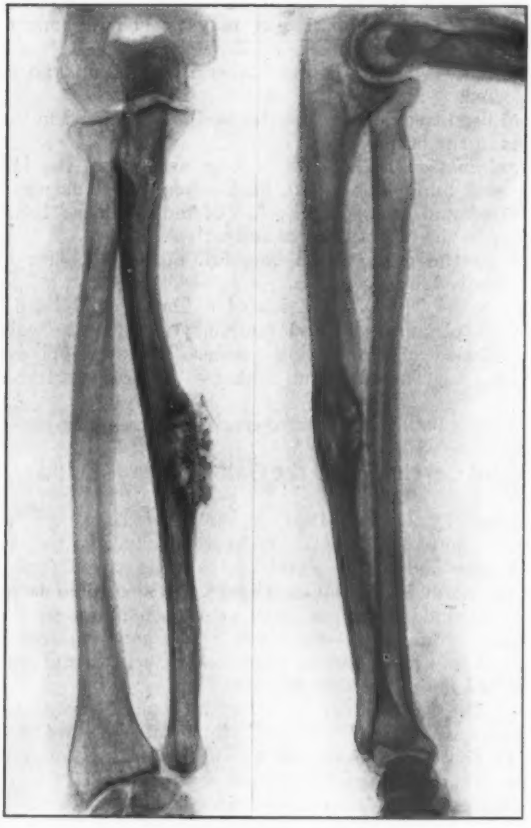
Pathological report.—"Gall-bladder 10 cm. long. Average diameter 6 cm. after it had been opened. Wall 4 cm. thick. Microscopically: Squamous-celled carcinoma. The growth is in rounded and elongated masses, with a considerable amount of fibrous stroma. It is only slightly keratinized but a few definite cell-nests and prickle-cells are present. It is infiltrated with eosinophils, and mitotic figures are frequent. This type of growth is unusual in the gall-bladder. It generally follows an inflammatory lesion associated with gall-stones, as in this case. The metaplasia

from columnar to squamous epithelium is then attributed to the inflammation before the carcinoma started."

The patient made an uninterrupted recovery and has not since suffered with his heart. The osteo-arthritic pains also have been much less severe. I suspected, however, that carcinoma would recur in the liver, and on November 25, when I was called to see him again, he was having intermittent attacks of vomiting and there was a palpable mass in the liver.

Cavernous Angeioma of Ulna.—C. E. SHATTOCK, M.S.

The patient, a woman, aged 61, had had a swelling in the right forearm for three years, with intermittent pain. This gradually increased in size, especially during the last year, when the aching pain had been persistent.



Cavernous angeioma of ulna.

On examination.—A hard and tender mass was found involving the mid-third of the shaft of the ulna. The skin over the swelling was hot.

Operation.—The mid-third of the shaft of the ulna was resected, together with the surrounding muscles. No graft was used. Fourteen needles (28 mgm.) of radium were buried in the wound for five days: Total dose 3332 m.e.h.

Cavernous angeioma of ulna. (× 60.)

The functional result was very fair. Thirteen years previously the patient had had a small tumour removed from the subcutaneous tissues of the right forearm. The pathologist's report on this was "hæmangio-endothelioma."

Jejunal Ulcer.—C. E. SHATTOCK, M.S.

The patient, a man, aged 42, had a posterior gastro-enterostomy performed nineteen years ago for duodenal ulcer. Since then he had had attacks of abdominal pain with long intervals between them. The pain occurred two hours after the taking of food, and was in the epigastrium and the right side. No vomiting; no hæmorrhage. It had been more severe recently and had confined the patient to bed. He had lost weight.

Operation.—An inflammatory mass was found in the first part of the duodenum: active ulcer. The gastro-enterostomy opening had become stenosed to the size of a finger. The jejunal ulcer was immediately distal to anastomosis, causing adhesion between the afferent and efferent loops of the jejunum. The base of the ulcer was adherent to the root of the mesentery, with a large inflammatory gland adjacent.

The jejunum was separated from the stomach and the affected segment of the jejunum was excised, an end-to-end anastomosis being made close to the duodeno-jejunal flexure.

Partial gastrectomy was performed, including the gastro-enterostomy opening, the stomach being divided just proximal to the pylorus. The patient made a good recovery.

Specimen.—The stomach has been sutured to the jejunum after removal, at the site of the gastro-enterostomy.

Adenoma of Thyroid Gland (Calcified).—J. B. HUME, F.R.C.S.

The tumour was removed at operation from a woman aged 48. A swelling had been present in the neck for almost five years, and for the six months preceding the patient's admission to hospital had been associated with persistent cough and some mild symptoms of hyperthyroidism. At the operation, together with this tumour, another adenoma, which was not calcified, was also removed.

Carcinoma of the Stomach: Specimen.—J. B. HUME, F.R.C.S.

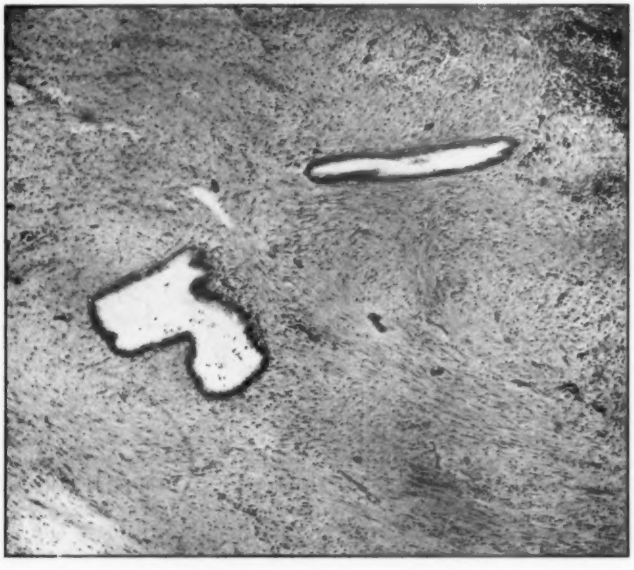
The pyloric end of a stomach showing an extensive proliferating carcinoma, bulging into its lumen and infiltrating the walls. Secondary deposits can be seen in the glands along both curvatures.

Microscopically the growth is seen to be an adeno-carcinoma, and metastases are present in the glands.

It was removed from a man, aged 67, who was admitted to hospital on account of pain in the left hypochondrium having the character of "angina of effort." The pain was present when the patient was working as a gardener, and when he walked up-hill, and it radiated to the left arm. There were no symptoms referable directly to the stomach. The heart was normal. The low position of the pain led to an X-ray examination of the stomach which revealed the condition.

Four Microscopical Sections of Endometrioma.—R. S. PILCHER, F.R.C.S.

(1) Tumour found in the sac of an inguinal hernia. From a woman, aged 40, who had noticed a swelling for ten years, which had increased during the previous



Case 1.—Section of tumour found in hernial sac, showing two glandular spaces lined with columnar epithelium. (× 60.)

three months, but was reducible until three days before her admission to hospital, when it had become painful, hard and tender. It was thought to be strangulated omentum, but at operation was found to be a nodular tumour riddled with small

cysts containing altered blood. It was apparently growing in the sac of an inguinal hernia. No history of association of symptoms with menstruation was obtained.

The microscopical section shows glandular spaces lined with columnar epithelium in a fibrocellular stroma. There are also larger spaces lined by flattened epithelium.

(2) Tumour found in the sac of an inguinal hernia. From a woman, aged 34, who had shown the signs of an indirect, incomplete, reducible hernia. At operation there was found in the sac a thick-walled, loculated cyst containing altered blood. The patient was menstruating at the time of the operation. After operation the history was investigated in more detail, and the patient stated that her first symptom had been pain in the groin, which she had had for four months, the swelling appearing two months later.

The microscopical section shows large cystic spaces lined with flattened epithelium, and in the wall of the largest a single tubular gland. Beneath the epithelium there are clumps of large cells containing yellow pigment, probably evidence of old hæmorrhage.

(3) Tumour of the round ligament. From a woman, aged 34, with a two and a half years' history of a swelling in the right groin; the swelling was painful and larger in the week after menstruation. She was sent to hospital as irreducible hernia had been diagnosed, but no hernia was found at operation, the tumour being continuous with an enlarged round ligament. The tumour was apparently solid but the cut surface showed small cystic spaces containing blood. The microscopical section is similar to that described in (1). The stroma-cells of the tumour surrounding the glands are very numerous.

(4) Tumour found in an appendicectomy-scar hernia. From a woman, aged 22, who at the age of 7 years had undergone operation for appendix abscess. For three months she had had pain in the scar, the pain being worst at the time of menstruation. She was found to have an irreducible hernia through a scar in the right iliac fossa. At operation a mass of thickened omentum was found adherent to the sac, and on the surface of the mass were several small cysts containing altered blood. The section is through the wall of one of these cysts, which has an irregular epithelial lining deep to which is extravasated blood and large numbers of round cells. A single tubular gland can be seen in the wall.

Comment.—The presence of an endometrioma should be suspected when a patient presents a lump in the groin, or an irreducible hernia, which is the seat of pain during menstruation. Its recognition is of importance, since incomplete removal of the tumour may be followed by recurrence. The diagnosis requires histological confirmation, and in two of the cases which I have shown this was not obtained until several sections from different parts had been cut. In the other two the glandular elements are so numerous that there is no doubt about the nature of the tumour.

In the extensive literature of endometrioma there are few references to the condition in hernial sacs. In a series of 159 cases reported by Smith [1] there was only one in an inguinal hernia. Sampson [2] has reported a case in which the hernial endometrioma was associated with the same condition in the pelvic peritoneum and ovaries. Christopher [3] describes a case in which menstrual periodicity of symptoms in a hernial endometrioma continued after removal of the uterus.

Sampson [4] has described three ways in which endometrium may reach abnormal situations: (1) by direct invasion; (2) by intraperitoneal transplantation after escape from the tubes, and (3) by vascular embolism. The tumour in appendicectomy-scar hernia can only have been a transplant; the round-ligament

tumour probably arises by vascular embolism, unless it develops from embryological rests; the tumours in inguinal hernia sacs may be transplants, or they may have arisen in the round ligament and invaded the peritoneum of the sac secondarily.

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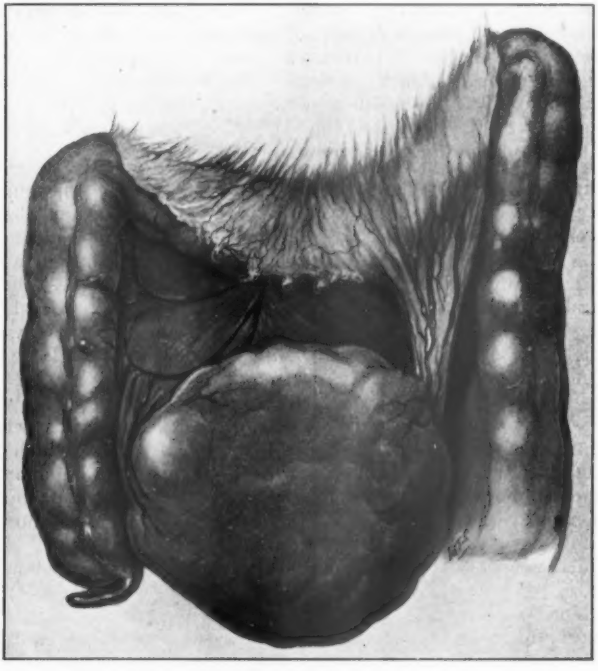
Large Fibroma of the Great Omentum.—RUPERT CORBETT, M.Chir.

The tumour has a smooth capsule and its surface is a little lobulated. On section it presents a variegated appearance; some areas are yellowish, others dirty white, whilst some are hæmorrhagic or cystic. Many places show a whorled appearance of the tissues.

Microscopic examination.—The growth is a fibroma showing many areas of hyaline degeneration.



It was removed at operation from a woman, aged 58, who weighed 20 st. She was admitted to King George's Hospital on account of biliary colic, followed by jaundice. There was also a history of progressive increase in weight, with abdominal discomfort.

On admission.—The patient was jaundiced and the tumour could be palpated in the lower abdomen as a freely mobile mass. Exploratory laparotomy was carried out. The tumour was found suspended between two attachments, (i) omentum

in the region of splenic flexure, (ii) mesentery in ileo-cæcal region as shown in the illustration. A large stone was present in the common bile-duct and was also removed.

Hypernephroma with Hæmorrhage.—RUPERT CORBETT, M.Chir.

One half of a right kidney, the lower pole of which is expanded by a tumour into which a large hæmorrhage has occurred. The tumour is bright yellow, but there are also dark red areas which are due to old hæmorrhages. There is a translucent fibrous capsule surrounding the tumour, and in some places dipping down into it. The large mass of blood-clot which is expanding the tumour is laminated inferiorly, but the remainder is of more recent origin.

Microscopic examination shows the structure of a hypernephroma. There are numerous thin-walled blood-vessels and hæmorrhages. Removed at operation from a woman, aged 32. Six years previously she had noticed a swelling in the right loin. There was no pain, but the tumour increased in size. Four years later it was explored, and a cyst was found in association with the right kidney. It was not removed, as the function of the other kidney had not been investigated. Nothing further was done for two years. There was no hæmaturia or increased frequency of micturition.

Excretory urograms showed a dilatation of the upper part of the right renal pelvis. In the lower part of the kidney there was no sign of calyces. The kidney was removed and the patient made an uneventful recovery.

Infarct of Kidney (Ruptured).—RUPERT CORBETT, M.Chir.

One half of a left kidney, in the middle third of which is a hæmorrhagic infarct. Blood escaping from the infarct has torn up the cortex of the kidney, and a mass of blood-clot lies partly inside and partly outside the kidney. The pelvis is flattened out by the hæmorrhage. The remainder of the kidney, with the exception of the lower pole, is pale. This is probably a pressure-effect, as section does not suggest that it is infarcted.

Microscopic examination shows the hæmorrhagic infarct and, in the remainder of the kidney, a mild degree of focal embolic nephritis.

It was removed at operation from a woman aged 29, who was suffering from subacute bacterial endocarditis. A short-chained non-hæmolytic streptococcus had been grown from the blood. Three weeks before operation she began to have left-sided abdominal pain. The left kidney was enlarged and tender. The urine contained a trace of albumin and blood, and on culture gave a pure growth of *B. coli*.

In view of these findings it was decided to explore the kidney. After blood-clot had been evacuated, there was profuse hæmorrhage from the kidney and nephrectomy had to be performed. The patient recovered from the operation but died of infective endocarditis two months later.

Ruptured Infarct at Lower Pole of Kidney.—M. F. NICHOLLS, F.R.C.S. (for R. MARNHAM, F.R.C.S.).

History.—The patient, a man, aged 27, was admitted to St. George's Hospital in December 1933, with symptoms suggesting a perforated appendix.

At operation he was found to have acute intestinal obstruction, due to a band running from the base of a chronically inflamed appendix to the brim of the pelvis. The band was cut and the appendix removed.

Five days afterwards symptoms of general peritonitis developed. The abdomen was opened and the peritoneal cavity was found to be full of pus. A tube was put into the pelvis and the wound was closed.

Shortly afterwards a fæcal fistula developed, and persisted for three months. During this period a right-sided epididymitis also developed; this suppurated and had to be opened. The pus was sterile. Repeated examinations of urine showed no organisms.

The patient was discharged to a convalescent home in April 1934. After he had been there three weeks he had a sudden attack of severe abdominal pain, which was most marked in the right loin. It was accompanied by vomiting.

He was readmitted to hospital in May 1934, when he had a tender mass in the right loin. The white blood-cell count was 42,000; 91% polymorphonuclears. The condition was diagnosed as perinephric abscess, and it was decided to open this through the loin. No pus was found, but there was a large perinephric hæmatoma, and nearly a pint of blood-clot was removed. On exposing the kidney the ruptured infarct was found at the lower pole, and nephrectomy was performed. Three days later the white blood-cell count had fallen to 12,000. The patient then made an uninterrupted recovery, and was discharged five weeks after the operation.

A section showed an infarct of the kidney; there was no evidence of its being infected.

Meningioma.—J. PATERSON ROSS, M.S.

The specimen is a portion of the vertex of the skull in the parietal region, having attached to it a segment of the superior longitudinal sinus and an ovoid tumour, measuring 4 cm. by 3·5 cm., growing just to the right side of the sinus. The skull bone is unusually thick and there is a slight elevation on the exterior, corresponding to the site of the tumour on the inner aspect. Histological examination of the tumour shows the typical appearances of a meningioma.

It was removed by operation from a woman aged 33. Three years previously she had had a fit, followed by right-sided headaches. Six months before operation fits recurred and became increasingly frequent; they were preceded by a clouding of the left visual field. They began in the left great toe and spread up the left side of the body. Consciousness was lost during the fits, which were followed by vomiting and severe headache.

Examination showed bilateral papillœdema, and signs of a lesion of the right motor cortex. A skiagram showed slight thickening of the inner table of the skull in the right parietal region. The Wassermann reaction was negative. Cerebro-spinal fluid pressure: 300 mm. of C.S.F.; the fluid contained 40 mgm. % of protein, but was otherwise normal.

At operation a large bone-flap was cut, extending across the middle-line. On elevation of the bone the tumour came away with it, tearing the superior longitudinal sinus and leaving a hollow depression on the cortex. Hæmorrhage was controlled by muscle-packing. After operation the patient had a left hemiplegia from which she gradually recovered completely.

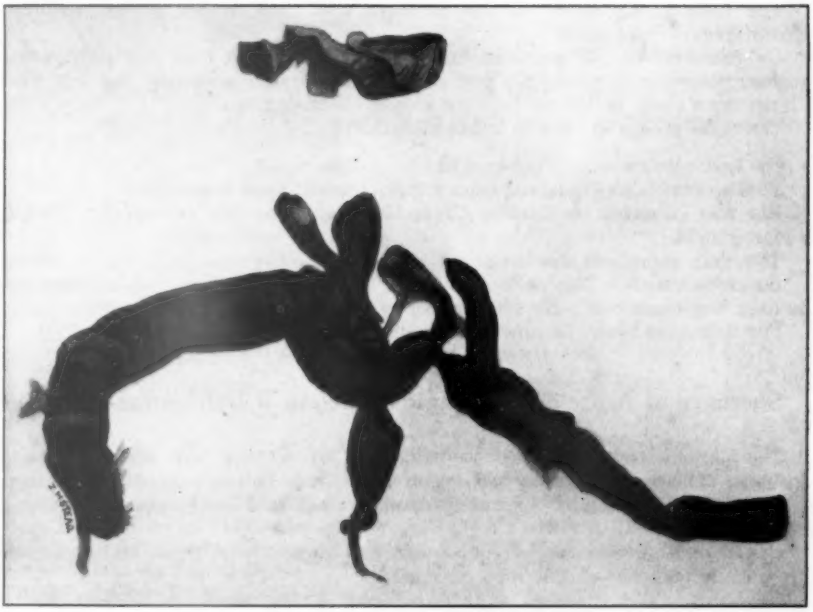
Two Clots removed by Pulmonary Embolectomy.—W. E. UNDERWOOD, F.R.C.S.

A woman aged 39 was admitted to hospital on account of bilateral renal calculi.

23.3.33: Right pyelo-lithotomy; a branched renal stone was removed with some difficulty. Patient remained well after operation but her temperature never subsided, fluctuating between 98·4° and 100°.

3.4.33: 10.15 a.m. Pulmonary embolism; 10.30 a.m. operation commenced; 10.38 a.m. heart commenced to beat after cardiac massage, but ceased a few minutes later.

Specimen.—The upper drawing shows the firm clot, pale grey in colour and noticeably laminated, which was found lying across the bifurcation of the pulmonary artery.



The lower clot is soft, red, and not laminated; it was found in the branches of the pulmonary artery distal from the other clot.

Microscopical examination.—Lamination is well-marked in the old clot while the more recent clot appears to be nothing more than a mass of red blood-cells.

Basal-celled Carcinoma of the Scalp in a Girl.—W. E. UNDERWOOD, F.R.C.S.

The patient is now aged 26.

When she was aged 19 an ulcer appeared on her scalp and, after proving resistant to the usual ointments, it was treated with radium and X-rays over a period of twelve months.

Up to 18 months ago the ulcer had never really healed, but there was then a healed area corresponding roughly with the bald area in the specimen.

About this time she knocked her head, and the accident caused the ulcer to spread and involve a fresh area of the scalp, as seen in the specimen.

Operation (4.4.33).—Complete excision of the whole area and repair by rotation of the scalp.

Report on microscopical examination.—Basal-celled carcinoma.

There has been no recurrence since this date.

Two Specimens of Neuroblastoma.—D. TREVOR, F.R.C.S.

(1) Right suprarenal. (Hutchison's type.)

This specimen was obtained from a boy aged two years, who was admitted under the care of Dr. C. J. K. Hamilton to Charing Cross Hospital in 1932.

The history (according to the mother) was that of six weeks' abdominal discomfort and indigestion.

On examination.—There was found to be a swelling over the right angular process, proptosis of the right eye, and some ecchymosis around the left eyelid. A large mass could be felt in the right side of the abdomen.

The child gradually became worse and died.

(2) Left suprarenal. (Pepper type.)

This specimen was obtained from a female infant aged 3 months.

She was admitted to Charing Cross Hospital under the care of Dr. Hamilton in March 1934.

The main complaint was malnutrition and irritability.

On examination.—The child was found to be much wasted, and enlargement of the liver was made out. No other abnormal physical signs were detected.

The infant gradually became worse and died.

Specimen of Acute Hæmorrhagic Infarction of Duodenum.—E. S. PAGE, F.R.C.S.

The patient was a married woman, aged 51. There had been no previous illnesses. The present illness had begun three days before patient's admission to hospital. She complained of generalized abdominal pain, with copious vomiting of brownish fluid.

Condition on admission.—The abdomen was uniformly enlarged, and a succussion splash could be heard in the upper abdomen.

Operation.—The abdomen was opened under general anæsthesia. The small gut was found to be somewhat dilated and injected. Tracing the small gut upwards towards the stomach, the gut at the duodenal-jejunal flexure was found to be much enlarged, and the duodenum itself was enlarged, tense, and enormously dilated.

The patient now showed urgent signs of collapse, and the abdomen was closed. She died three hours later.

Post-mortem report.—Head and thorax: not examined. Abdomen: no general peritonitis. The small intestine—with the exception noted below—and the large intestine were normal, healthy, and almost completely empty. The stomach showed some congestion and excess of mucus, especially at the cardiac end.

The first inch of the duodenum appeared to be normal. From that point onward the duodenum was a completely rigid tube. The walls were from a quarter to half an inch thick and deeply congested, the congestion extending from the serous to the submucous coats. The mucous membrane itself was œdematous and polypoid, but quite pale. It was not ulcerated.

This condition extended to the end of the duodenum, after which it tailed off slowly, so that four inches beyond the duodenal-jejunal junction the gut had again become normal.

Adrenals normal. Kidneys show some cloudy swelling. Liver pale; no gallstones. Pancreas normal.

Cultures for B. anthracis were made, but were negative.

Cause of death: Intestinal obstruction by acute hæmorrhagic infarction of the duodenum.

Section of Therapeutics and Pharmacology

President—J. H. BURN, M.D.

[*November* 13, 1934]

The Use of Gonadotropic Hormones in the Treatment of Undescended Testes: Preliminary Report.

By A. W. SPENCE, M.D., and E. F. SCOWEN, M.D.

ABSTRACT.—Smith and Engle have shown that the injection of extracts of the anterior lobe of the pituitary into immature animals produces an increased growth of all the tissues of the testes, and, as a result of stimulation of the interstitial tissue, enlargement of the penis and accessory genital glands. Spermatogenesis is not produced in immature mammals by means of these extracts. Similar results are obtained with extracts of pregnancy urine, the gonadotropic principle (A.P.L. or anterior-pituitary-like hormone) of which is probably derived from the placenta. Engle has also shown that the injection of extracts of anterior lobe or of pregnancy urine causes descent of the testes in immature monkeys, in which animals they are situated in the inguinal canal.

Eleven patients with undescended testes, aged 4½ to 15 years, have been treated with the gonadotropic hormones extracted from pregnancy urine. The dose used in most cases was 500 rat units injected intramuscularly twice weekly. Five of the patients had bilaterally undescended testes: during treatment both testes descended into the scrotum in two cases, one descended in each of two cases, and in the remaining case the position of the testes is unchanged. The remaining six had unilaterally undescended testes; of these, three have descended into the scrotum. Thus, nine of sixteen undescended testes have entered the scrotum during treatment. The time taken to effect this change varied from two to eleven weeks. The testes which have not yet responded have received treatment for from three to nine weeks. The mechanism whereby the descent is brought about is unknown.

In view of the rather unsatisfactory surgical results, it is felt that in the treatment of undescended testes a trial should be made of this form of therapy before surgical measures are considered.

RÉSUMÉ.—Smith et Engle ont montré que l'injection d'extraits du lobe antérieur de l'hypophyse augmente la croissance de tous les tissus testiculaires chez les animaux impubères, et, comme suite de la stimulation du tissu interstitiel, la croissance du pénis et des glandes génitales accessoires. Ces extraits ne produisent pas la spermatogénèse chez les animaux impubères. Des résultats analogues sont produits par l'extrait d'urine de femme enceinte, dont le principe gonadotrope (A.P.L. ou hormone semblable au lobe antérieur de l'hypophyse) provient probablement du placenta. Engle a aussi montré que l'injection

d'extraits du lobe antérieur de l'hypophyse produit la descente du testicule chez les singes impubères, chez lesquels il est situé dans le canal inguinal.

Onze enfants cryptorchides, âgés de quatre ans et demi à quinze ans, ont été traités par des hormones gonadotropes, extraits des urines de femme enceinte, en injections intramusculaires, en général de 500 unités de rat deux fois par semaine. Chez cinq de ces enfants il existait une cryptorchidie bilatérale, chez deux cas les deux testicules sont descendus dans le scrotum pendant le traitement, chez deux autres un testicule est descendu, et chez le dernier la position des testicules n'a pas changé. Chez les 6 autres la cryptorchidie était unilatérale, chez 3 d'entre eux le testicule est descendu dans le scrotum. Donc 9 sur 16 testicules sont descendus dans le scrotum pendant le traitement. Le temps nécessaire pour obtenir ce résultat a varié de 2 à 11 semaines. Les cas qui n'ont pas encore réagi ont été traités de 3 à 9 semaines. Le mécanisme produisant la descente du testicule est inconnu.

Etant donné les résultats peu satisfaisants du traitement chirurgical, il semble que le traitement décrit ici devrait être essayé avant la chirurgie.

ZUSAMMENFASSUNG.—Smith und Engle haben gezeigt dass nach Einspritzung von Hypophysenvorderlappenextrakt bei infantilen Tieren ein erhöhtes Wachstum aller testikulären Geweben, und infolge Reizung des interstitiellen Gewebes, eine Vergrösserung des Penis und der akzessorischen Genitaldrüsen erfolgt. Die Spermatogenese wird durch diese Extrakte in infantilen Säugetieren nicht erzeugt. Ähnliche Erfolge können durch Gravidenharnextrakt erzeugt werden. Das gonadotropische Prinzip (A.P.L., oder hypophysenvorderlappenähnliches Hormon) stammt wahrscheinlich von dem Plazenta her. Engle hat auch gezeigt dass die Einspritzung von Vorderlappenextrakt oder Gravidenharn bei infantilen Affen das hinabsteigen der Hoden erzeugt. Bei diesen Tieren liegen die Hoden im Inguinalkanal.

Elf Fälle von Kryptorchidie, im alter von 4½ bis 15 Jahren, wurden mit gonadotropen, aus Gravidenharn hergestellten, Hormonen behandelt. Die Dosis betrug meist 500 Ratteneinheiten intramuskulär, zweimal wöchentlich. Bei 5 Fällen stiegen während der Behandlung beide Hoden in den Hodensack hinab, bei 2 Fällen kam ein Hoden hinunter, während bei 1 Fall die Lage unverändert blieb. Bei den anderen 6 Fällen war die Kryptorchidie einseitig: bei 3 ist der Hoden in den Hodensack hinabgestiegen. Die Behandlungszeit schwankte bei diesen Fällen zwischen 2 und 11 Wochen. Die Hoden die noch nicht reagiert haben sind von 3 bis 9 Wochen unter Behandlung. Der Mechanismus wobei diese Erfolge erzielt werden ist unbekannt.

Mit Rücksicht auf die wenig befriedigenden Erfolge der Chirurgie sollte die oben beschriebene Behandlung vor dem chirurgischen Eingriff in Betracht kommen.

IT has long been known that a relationship exists between the anterior lobe of the pituitary and the gonads, but it is only within comparatively recent years that the gonad-stimulating properties of extracts of the anterior lobe have been demonstrated. Large amounts of gonadotropic hormones, similar in action to those produced by the pituitary, were found by Aschheim and Zondek [1] to be present in the urine of pregnant women. Preparations from this source are usually employed clinically, and have been used in the present work.[1] Their identity, however, with the gonadotropic hormones of the anterior pituitary has not been established (Evans [2], Collip [3], Leonard [4]), and for this reason they are spoken of as anterior-pituitary-like hormones.

The Ill-effects of Undescended Testes.

The undescended testis, when present in the inguinal canal, is more liable to trauma and frequently gives rise to pain. The condition is practically always

[1] We are indebted to Dr. A. Macbeth, of the Organon Laboratories, for generous supplies of the gonadotropic hormones which were used in this investigation. The preparation is known as "pregnyl."

associated with a congenital inguinal hernia or hernial sac. Malignancy is said to occur fifty times more frequently in the undescended than in the scrotal testis; some authors, however, dispute this, and consider the incidence of malignancy in the undescended testis to be greatly over-estimated. It is occasionally associated with nervous disorders, such as enuresis, and in some boys is a source of anxiety, because they differ from their fellows. In post-puberty the condition may give rise to mental disturbances, ranging from slight worry to severe sexual neuroses. This is more marked in bilateral cryptorchids, the vast majority of whom are sterile. The arrest of one testis is very rarely associated with mental deficiency or imperfect bodily growth, but the arrest of both is often accompanied by abnormal development, mental and physical. Physically, the individual may be of the eunuchoid type, or, less frequently, have other stigmata of degeneration.

In the vast majority of retained testes spermatogenesis does not occur. Griffiths [5] in 1892 considered that there had never been brought forward an indisputable case of spermatogenesis in a retained testis. Since then, however, Rawling [6] examined twenty-seven testes removed at operation and found definite spermatogenesis in ten. A few cases have also been observed by other writers (Uffreduzzi [7], Bland-Sutton [8]). Odiorne and Simmons [9] reported a case of a bilateral cryptorchid, aged 20, who was fertile. Southam and Cooper [10] examined a series of undescended testes at different ages, and found that until puberty many of the tubular cells retain their healthy pre-adolescent characteristics in spite of reduction in the amount of parenchyma. After puberty degenerative changes occur, which are more marked the higher the arrest. These changes consist of fibrosis and at first, apparent—later, actual—disappearance of the tubules, with consequent aspermatogenesis.

Experimentally, Griffiths [5] demonstrated that when the testis of a young dog is placed in the abdomen, it undergoes little change, but when it is placed there after puberty the germinal epithelium disappears and spermatogenesis does not occur. Similar results were obtained by Moore [11, 12] and by Wangensteen [13], both of whom also showed that replacement of the testis in the scrotum, after it has been resident in the peritoneal cavity or inguinal region until most of the germinal epithelium has disappeared, will be followed by regeneration of the germinal cells and normal spermatogenesis. It appears, then, that for spermatogenesis to occur the presence of the testis in the scrotum is essential and that absence of spermatogenesis in the retained testis is a secondary phenomenon rather than a primary congenital imperfection as Hunter supposed. The work of Crew [14], Moore [12], and Fukui [15], has shown that spermatogenesis is connected with the temperature of the scrotum, which is several degrees lower than that of the inguinal canal or abdominal cavity, and that the degenerative changes which take place in an undescended testis are the result of the higher temperature to which it is subjected.

Experimental Work on the Action of Gonadotropic Hormones in the Male.

The influence of the pituitary gland on the gonads has been demonstrated experimentally by the work of Smith and Engle [16, 17], Evans [18], and numerous other investigators. Following the removal of the pituitary in the adult male rat there is a general atrophy of the testes; daily transplants of the anterior lobe, or injections of anterior lobe extracts, cause an increase of all the components of the testes and induce spermatogenesis. Daily transplants of anterior lobe into normal immature rats result in an increase of all the tissues of the testes and increased growth of the penis and accessory genital glands, but there is no acceleration of spermatogenesis. The action of the hormone on the accessory genital glands is indirect, through

stimulation of the interstitial cells of the testes, as no result is obtained after castration. Similar results have been obtained in immature animals by means of extracts of pregnancy urine [19], the gonadotropic hormones of which are probably derived from the placenta [3]. Most investigators agree that in immature mammals the main change lies in hypertrophy and hyperplasia of the interstitial cells and increased tubular growth, but that spermatogenesis is not induced. According to Smith and Leonard [20] extracts of pregnancy urine bring about some degree of spermatogenesis in the hypophysectomized adult animal, a finding which is not in agreement with the work of Collip and his collaborators [21].

In immature monkeys the testes are situated at the upper end of the inguinal canal. Engle [22] has shown that injections of extracts of anterior pituitary or of pregnancy urine cause descent of the testes into the scrotum by the fourteenth day.

Therapeutic Use of Gonadotropic Hormones in Undescended Testes.

As proprietary preparations of the gonadotropic hormones contained in pregnancy urine are now available in a form suitable for human administration, we have made use of them in the treatment of eleven patients with undescended testes. Of these six were unilateral and five bilateral. The ages of the boys ranged from $4\frac{1}{2}$ to 15 years. The examination of the position of the testes was made when the patients were standing up, for in boys the action of the cremaster is often so brisk that, when they are lying down, the testis, though normally in the scrotum, may be retracted into the inguinal canal. Care was also taken to note the degree of mobility of the testis and whether it could be pushed into the neck of the scrotum. The dose of gonadotropic hormone used in the majority of cases was 500 rat units[1] injected intramuscularly twice weekly.

Of the six unilaterally undescended testes, three have entered the scrotum, one after two, one after six, and one after eleven weeks of treatment. The remaining three, which have not yet descended, have received treatment for three, eight and nine weeks respectively. Of the five bilaterally undescended testes, both testes have entered the scrotum in two cases—in one patient at the end of two and four weeks respectively, and in the other at the end of five and nine weeks. However, in this last patient (No. 1 in the table, p. 53), after twenty weeks of treatment the scrotum is still very small and retracted, so that the testes vary in their position, one day being in the scrotum and another in the inguinal canals. This patient, when he was first seen, was kept under observation in the ward for two weeks before treatment was begun, and never at any time were the testes palpated either in the scrotum or in the inguinal canals, although frequently examined by several clinicians. In the remaining three cases of bilaterally undescended testes, so far, one testis has descended in each of two patients, who have received treatment for six and eight weeks respectively. In one of these cases, after two weeks of treatment the testis lay well down in the scrotum, whereas previously it had been in the inguinal canal and could be pushed only as far as the neck of the scrotum. In the other case a unilateral orchidopexy had been performed a year previously, but the testis had subsequently retracted into the inguinal canal; after four weeks of treatment it lay in the mid-scrotal position, whereas previously it lay in the inguinal canal, but could be pushed as far as the neck of the scrotum. The remaining case of bilaterally undescended testes remains unchanged after eight weeks of treatment. In brief, of sixteen undescended testes treated with gonadotropic hormone, nine have descended

[1] A Janssen-Loeser rat unit of gonadotropic hormone is the least amount which will provoke œstrus in 50% of the animals, injected with all necessary precautions [23].

into the scrotum in periods ranging from two to eleven weeks; those which have not yet responded have received treatment for periods ranging from three to nine weeks. Details are given in the accompanying table (pp. 35, 36).

We have found that in several patients the testes have increased in size during treatment. There may also be some slight enlargement of the penis and early sprouting of pubic hair.

Two boys, aged 12 and 14, with obesity associated with gonadal hypoplasia, are also being treated with the gonadotropic hormones in doses of 500 rat units injected intramuscularly twice weekly (Cases 12 and 13). So far, treatment has extended over a period of six weeks, during which time the testes have increased somewhat in size but there has been no reduction in body-weight.

Discussion

Schapiro [24] in 1930 used gonadotropic extract from pregnancy urine in the treatment of twenty-six cases of hypogenitalism, 13 of whom were cryptorchids; the testes descended into the scrotum more or less completely in all cases and an appreciable enlargement of the testes and penis occurred in some. Successful results have since then been reported by Goldman and Stern [25] in all of four boys with undescended testes, by Kunstadter and Robins [26] in all of three, and by Sexton [27] in four of six cases of cryptorchidism. Rubinstein [28] has reported a case of dystrophia adiposo-genitalis with intra-abdominal testes, treated with gonadotropic hormone; at the end of five months the left had completely descended and the right partially. Aberle and Jenkins [29] caused the testes to descend in two of four cases treated; in only one case was the descent complete. They admit that the doses were small.

In assessing our own results we must consider whether the testes would have descended into the scrotum of their own accord by the time puberty arrived, and if so, whether they would have descended spontaneously during the period in which the patients have been under observation. Wangensteen [13] states that only rarely does the testis reach the scrotum by its own initiative if it has failed to do so at the end of the first year. Southam and Cooper [10] say that spontaneous descent is not common after the first three years of life. Rawling [6] used to delay operation until after the age of 7 years, and Higgins and Welti [30] state that if by manipulation the testis can be brought to the bottom of the scrotum, descent will always occur at puberty, and that even testes which cannot be brought into the scrotum may descend between the ages of 10 and 12 years. Drake [31] reports that 24 of 38 undescended testes came down while under observation at ages ranging from 10 years to 16 in one case, and considers that the majority of unilateral undescended testes descend spontaneously by the age of 14 and become normal in size. This is the view of most surgeons with whom we have spoken. We feel, therefore, that in a large percentage of our patients spontaneous descent may have occurred by the time of puberty.

We have pointed out that descent occurred in our cases in from two to eleven weeks of treatment, the average time being about four or five weeks. We are of the opinion that as this phenomenon occurred so regularly and so comparatively soon after the commencement of treatment, it was due to the action of the gonadotropic hormones.

The mode of action of the gonadotropic hormones in bringing about testicular descent is unknown. Engle [22] suggests that these hormones may be involved in the intra-uterine descent of the testes. He points out that the gonadotropic principle is in the maternal circulation throughout the period of gestation, and that descent occurs when the hormonal production of the fœtal pituitary is low. He considers

that in cases in which neither testis leaves the abdomen it is more probable that it did not react to the stimulus of the hormones of pregnancy than that the hormone level dropped at too early a period, before the testis was sufficiently differentiated to respond. No proof for this latter statement has yet been furnished. It falls into line, however, with Hunter's [32] original view that failure of the testis to descend into the scrotum is due to a congenital imperfection of the organ. On the other hand, it does not explain spontaneous descent of the testis at or before puberty, or descent which is brought about by the administration of gonadotropic hormones. If one adheres to Engle's suggestion, one must postulate that in both of these cases the testis acquires gradually, in post-natal life, the ability to respond to the stimulus, and that spontaneous descent is also brought about by the increased production of gonadotropic hormones by the individual's pituitary, which becomes more active at the time of puberty. Those testes which do not respond to the gonadotropic hormones either have failed to acquire the ability to do so or are held up by mechanical defects, such as adhesions.

From the animal experimental work which has been quoted, it would appear that we should not expect spermatogenesis to occur as a direct result of the administration of the gonadatropic hormones in the treatment of undescended testes before puberty. Spermatogenesis would occur at puberty as a result of the testes having descended into the scrotum. One would expect, however, the appearance of secondary sexual characters, such as enlargement of the penis and growth of pubic hair, which occurred to a slight degree in several of our patients, as a result of stimulation of the interstitial tissue by the gonadotropic hormones.

With reference to the view that the majority of undescended testes will descend spontaneously before or at puberty, in our opinion there are several reasons for causing the testes to descend into the scrotum as soon as possible. (1) The scrotum is the normal habitat of the testis, and, as we have mentioned previously, the absence of the testis in this position may be a source of anxiety to the patient and his parents, and produce in him a sense of inferiority, especially when he is amongst his fellows at school. (2) The presence of the testis in the inguinal canal often causes it to be subject to unnecessary trauma. (3) The occurrence of pain, which was present in seven of our cases. (4) The work of Cooper [33], which indicates that the further the pre-adolescent testis has descended in its normal route, the more closely does it correspond histologically to the scrotal gland of the same age, although if the gland has descended by the time puberty has arrived it will develop normally. At puberty degenerative changes begin to occur, if the testis has failed to descend. (5) There are indications that the earlier the patient is treated with gonadotropic hormones, the greater is the chance that they will bring about descent.

How do the results obtained with the gonadotropic hormones compare with those of surgery? A study of the literature shows that surgeons differ considerably in the results which they report. Rawling [6] in 1908 considered that surgical replacement of the testis in the scrotum was unsuccessful; he found that there were only four fair results in 40 cases of unilateral orchidopexy. Since 1908 surgical technique has improved. Turner [34] (1925) reported 35 (70%) successes in 50 cases; the testes in the remainder either atrophied or retracted. In Burdick and Coley's [35] (1926) 537 cases a satisfactory position was maintained in about 50%, but in only about 15% of these the testes remained normal in size. Southam and Cooper [10] (1927) were successful in 72% of 50 cases; in the remainder the testes either atrophied or retracted. Cabot and Nesbit [36] (1931) reported that of 17 cases followed up for not more than two and a half years, the testis was in the normal scrotal position in 10, and in the upper scrotum in seven. A number of our surgical friends, without referring to statistics, state that their impression is that the operation is not very successful, whereas others emphatically deny this.

In view of this contradictory evidence and in view of the fact that we have obtained, so far, successful results in 56% of cases after a comparatively short period of treatment, we are of the opinion that trial should be made with the gonadotropic hormones before the patient is subjected to surgical measures.

[One of us (A. W. S.) is indebted to the Medical Research Council for personal and expenses grants.]

TABLE.—SHOWING THE RESULTS OF THE USE OF THE GONADOTROPIC HORMONES IN THE TREATMENT OF ELEVEN CASES OF UNDESCENDED TESTES AND TWO CASES OF OBESITY WITH GENITAL HYPOPLASIA

[R.U. = Rat units.]

No. of Case	Age (Years)	Clinical findings	Treatment	Result
1	11	W. C. Bilateral cryptorchid; testes not palpable; scrotum small and retracted. Penis normal. No pubic hair.	250 R.U. daily for five weeks; then 500 R.U. twice weekly for eleven weeks; then 1,000 R.U. bi-weekly for four weeks.	After five weeks: right testis in scrotum. After nine weeks: left testis in scrotum. Penis larger. Slight pubic hair. After twenty weeks: position of testes varies from inguinal canal to scrotum. Scrotum still small and retracted.
2	8	A. H. Right testis in inguinal canal; small, cannot be pushed into scrotum. Left testis normal. Penis normal. No pubic hair.	100 R.U. daily for two weeks, then 200 R.U. bi-weekly for five weeks, then 500 R.U. bi-weekly for nine weeks.	After eleven weeks, right testis in upper scrotum, slight pubic hair. After sixteen weeks: right testis in mid-scrotum; increasing in size.
3	8	S. C. Right testis normal. Left testis in inguinal canal, but easily pushed into neck of scrotum; always resident in canal.	200 R.U. bi-weekly for five weeks, then 500 R.U. bi-weekly for four weeks.	After six weeks: left testis in mid-scrotum.
4	10½	P. H. Bilaterally undescended testes. Four years: pain in both groins. One year: right orchidopexy. Later right testis retracted; now at external ring and can be brought into upper scrotum. Left testis at upper end of inguinal canal and can be pushed to external ring, but not into scrotum.	500 R. U. bi-weekly for eight weeks.	After three weeks: right testis in neck of scrotum, left unchanged. After four weeks: right testis in mid-scrotum. After six weeks: right testis in mid-scrotum, left in external ring. Patient says that right testis has never been as low as this even after operation.
5	13½	D. H. Left testis normal. Right testis small and at lower end of inguinal canal, but cannot be pushed into scrotum.	500 R. U. bi-weekly for seven weeks.	After two weeks: right testis in neck of scrotum. After three weeks: in mid-scrotum. After seven weeks: in mid-scrotum; increasing in size.
6	12	M. F. Bilaterally undescended testes. Pain in left groin. One year ago, left orchidopexy, but testis eventually retracted. Now left testis in mid-inguinal canal and with difficulty moved to external ring. Right testis in inguinal canal and easily pushed into neck of scrotum.	500 R. U. bi-weekly for six weeks.	After one week; right testis in mid-scrotum. After two weeks: low in scrotum. After six weeks: right testis low in scrotum, left at external ring.

No. of Case	Age (Years)	Clinical findings	Treatment	Result
7	10	F. B. Pain in both groins. Bilateral undescended testes, both in mid-inguinal canal; right can be pushed into neck of scrotum; left will not enter scrotum. Both small.	500 R. U. bi-weekly for five weeks.	After two weeks: right testis in mid-scrotum. After four weeks: both testes in scrotum, right increasing in size. After five weeks: right low in scrotum, left in mid-scrotum.
8	14	D. C. Pain in right groin. Left testis low in scrotum, but small. Right testis in mid-inguinal canal; cannot be pushed into scrotum.	500 R. U. bi-weekly for three weeks.	After three weeks, right testis engaged in external ring, left increasing in size.
9	13	F. C. Left testis normal, right in inguinal canal, cannot be pushed into scrotum. Penis small. Early pubic hair.	500 R. U. bi-weekly for nine weeks.	After nine weeks, position of testis unchanged. Penis larger.
10	4½	S. P. Left inguinal hernia, incomplete, reducible. Left testis undescended, not palpable. Right testis normal.	200 R. U. bi-weekly for four weeks, then 500 R. U. bi-weekly for four weeks.	After eight weeks, left testis still undescended, but palpable in inguinal canal. Right possibly slightly larger.
11	15	J. A. Pain in right groin. Bilateral undescended testes; left not palpable; right in lower inguinal canal, almost normal in size, cannot be pushed either up or down; tender.	500 R. U. bi-weekly for six weeks, then 1000 R. U. bi-weekly for two weeks.	After eight weeks, condition unchanged.
12	12	R. G. Obesity with gonadal hypoplasia. Four years: gradually increasing obesity. Intelligent. Fat generalized but greatest on trunk. Fingers tapering. Penis small. Scrotum small and retracted. Testes small. Pituitary fossa normal. B.M.R. −10%. Glucose tolerance: flat curve. Weight: 126 lb.	500 R. U. bi-weekly for six weeks.	After six weeks, testes larger in size, but scrotum still retracted. No change in weight (wt. 128 lb.).
13	14	R. D. Obesity with gonadal hypoplasia. Six years: gradually increasing obesity. Intelligent. Penis small, testes both in scrotum, but small. Pituitary fossa slightly small, 11 by 5 mm. Glucose tolerance: normal. B.M.R. + 10%. Weight: 149 lb.	500 R.U. bi-weekly for six weeks.	After six weeks, testes and penis increased in size. Still gaining in body-weight (wt. 161 lb.).

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Dr. LEVY SIMPSON said that there was rarely any justification for treating undescended testicle by gonadotropic hormone before the age of puberty, as in many cases the testes descended spontaneously at this period. Further, there was no danger of degeneration of the seminiferous tubules before puberty, and on theoretical grounds it would seem that the time to use a pituitary-like stimulus was that at which the testicle and adnexa were at their optimum sensitivity and receptivity.

There was a further use for gonadotropic hormone both before and after operation in the more refractory cases. This would prevent many relapses and delayed post-operative retraction into the abdomen.

It was interesting to note that premature spermatogenesis was produced by neither pituitary extract nor gonadotropic hormone from pregnancy urine; the parallel was not true of the ovary. An absence of spermatogenesis, however, occurred in spontaneous sexual precocity associated with adrenal tumours and hyperplasia. Renewal of spermatogenesis in the atrophied testes of hypophysectomized rats could be produced by gonadotropic hormone, and this therapy was therefore more strongly indicated in those patients exhibiting signs of pituitary deficiency in addition to undescended testicle. Renewed spermatogenesis could also be produced in the senile aspermic testicle, but the effect was temporary.

If a case of undescended testicle did not respond to treatment within a reasonable period, a gap in the therapy was advisable, as a refractory phase followed prolonged administration of gonadotropic hormone and, further, a reduction in the gonadotropic potency of the patient's own pituitary gland occurred.

Burrows had shown that in mice large doses of œstrin produced inguinal herniæ and a lax condition of the scrotum and inguinal regions. Since œstrin, as well as testicular hormone, occurred in the male, it was conceivable that œstrin was produced by stimulating the undescended testicle with gonadotropic hormone and then played some part in elongating the ligaments and adnexa concerned in the testicle's descent. Where, after treatment with gonadotropic hormone, the descent of the testicle was incomplete—as, for example, in the case recorded by Dr. Spence, in which there was a tight scrotum (Case I), it appeared probable that the additional use of œstrin might be of therapeutic value. Any resulting injury to the seminiferous tubules would be of only a temporary nature.

[*May* 8, 1934]

The Bragg-Paul Pulsator

An Apparatus for Prolonged Artificial Respiration by Sir William Bragg's Method.

Designed and developed by R. W. PAUL, M.I.E.E., F.Inst.P.

AN outfit for adults or young persons comprises a pulsator which rhythmically inflates an air-bag (encircling the bony thorax of the patient below the armpits) to a definite air-pressure as indicated by a manometer. The pulsator is readily transportable, works quietly, and may be placed at any moderate distance from the patient, being connected to the air-bag by a flexible hose-pipe. The action is independent of the position or movements of the patient. Normally the pulsator can be operated on any electric supply circuit or, in special cases, from accumulators; it can also be modified so as to be worked by a hand lever. In a different model power is taken from the town water-supply.

Pulsator mechanism and manometer.—A stout rubber bellows, 22 cm. diameter, is attached at one end to a plate carried by pillars on the pulsator base, its lower end being attached to a pressure plate. Axial movement of the latter causes the air capacity of the bellows to change by about 1·5 litres, an amount which can be varied if necessary. The upper plate bears a large nozzle for the connecting hose, a smaller nozzle with non-return valve through which an initial supply of air can be introduced from a hand pump, a release cock, and an adjustable safety-valve. Another cock provides connexion to a manometer, mounted on the machine, but capable of detachment for use in any neighbouring position.

The manometer can be set by means of a ball joint to face in any direction. It has a bold dial graduated in mm. of mercury column, the range being usually to 70 mm.

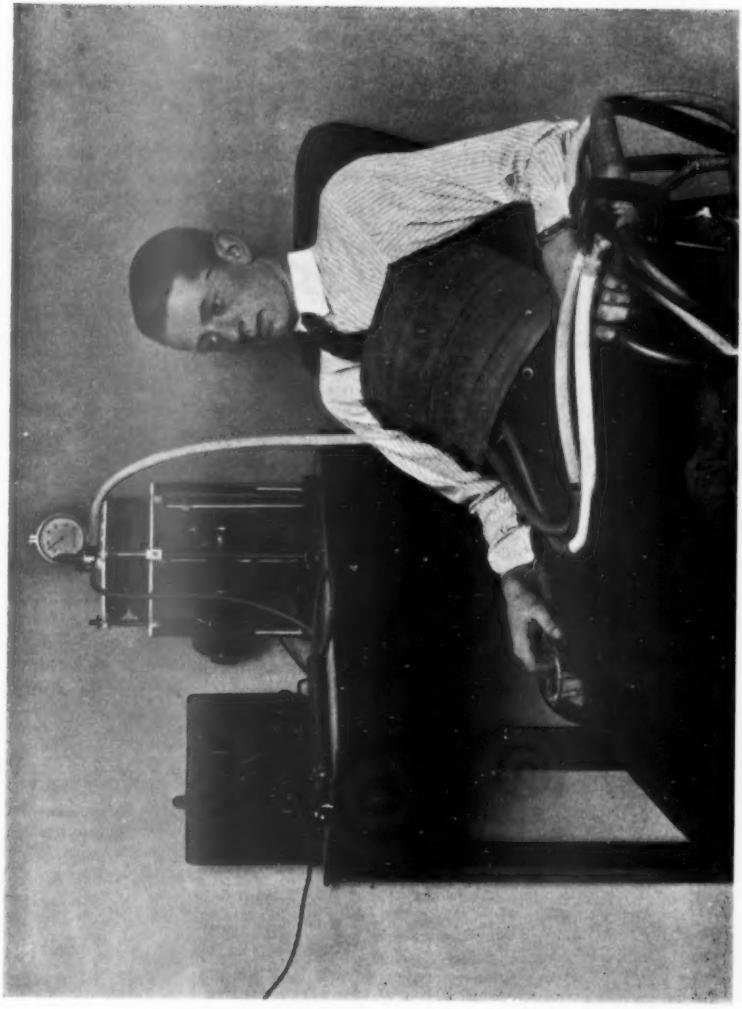
The air-bag having been adjusted on the patient and connected to the pulsator, the system is charged with air to an appropriate final pressure which, in the case of an adult, may be 30 or 40 mm. The pulsator is then started and conditions will remain constant for a long period.

Electrical drive and control box.—On the base of the pulsator is fixed a unit comprising a motor and gear-box, the output shaft being fitted with a crank. The latter carries a bearing-block sliding in a slotted yoke fixed to the pressure plate and running in vertical guides. The gear-box is grease-packed, and wick oilers are fitted to the other working parts. The motor is of the series universal type, to work on d.c. or a.c. circuits; as it takes only a fraction of one ampere, it may be connected to a lamp socket if desired.

Since there is no load on the motor during the down stroke of the pressure plate, compression springs are used to equalize the torque on the motor shaft.

The control-box enables the machine to be used on any voltage from 100 to 250, and the speed of the pulsator to be adjusted between 15 and 30 strokes per minute; a series resistance and an armature-shunt have dials by means of which they can be re-set to suit any pre-determined condition. All live parts are enclosed, plugs and lead being provided for the input and output connexions, with double-pole switch and fuse.

Hydraulic drive.—Where electricity is not available this model can be used on a water-supply at 50 to 150 lb. per square inch. The axial motion of the pressure plate is given by a piston about 5 cm. diameter, working in a cylinder of which the upper end is open. A fine-adjustment valve controls the water flow and the speed. The pressure plate carries tappets acting, at each end of the stroke, on a rocker which is spring-loaded so as to tip suddenly on passing its dead centre. This rocker controls a two-way balanced piston-valve sliding freely in a block



attached to the hydraulic cylinder. When the bellows is fully extended the valve trips and connects the cylinder to the water supply, the piston rising until the bellows is compressed. Reversal takes place, and long tension springs then cause the water to be expelled through a waste-pipe, and the bellows again to extend. The length of stroke can be varied, if necessary, by adjusting the tappets. The upper end of the valve is enclosed in a flexible chamber with drain to carry off any slight leakage of high-pressure water. Once in three days a little grease should be applied to the two nipples on the valve block; the other working surfaces are provided with greasing pads. Experience of continuous operation for many months indicates that the flow of water is about 700 gallons per twenty-four hours; this could be re-utilized for other purposes.

Air-bags.—Normally the air-bag is of stout rubber and has a flattened rectangular shape. Its outer surface has a canvas covering vulcanized on it and integral with straps fitted with prongless buckles. When in place it almost encircles the bony thorax below the armpits. At each end of the bag is a rubber tube, and a metal fitting provides means of connecting together these tubes and by a hose-pipe to the pulsator. The metal fitting can be clamped to a bed-rail. Several sizes of air-bag are available, ranging from, say, 38 in. by 10 in. for an adult to 11 in. by 3 in. for a newly born infant. No exact fitting is necessary. In case of injury to one side of the thorax, it has been found that a bag of half-length suffices to cause action by both lungs.

The above apparatus has been tested and approved at the London School of Hygiene and Tropical Medicine by Dr. P. M. T. Kerridge, who also suggested the form of the air-bag. The apparatus is being manufactured by Messrs. Siebe, Gorman and Co., Ltd., 187 Westminster Bridge Road, S.E. 1.

By the courtesy of Professor H. A. Harris, X-ray photographs have been taken in the Anatomy Department of University College, London. Antero-posterior and lateral views of the thorax of a normal subject were photographed, with and without the pulsator in action. With the apparatus working, the diaphragm was higher, the antero-posterior diameter of the lower part of the thorax was increased and the lateral diameter diminished. Thus the normal expiratory position was exaggerated, but not so much as might have been produced in voluntary forced expiration. The pressure in the air-bag was 47 mm. Hg when the photographs were taken. This was sufficient to increase the respiration of the subject without causing discomfort.

Section of Laryngology

President—W. M. MOLLISON, M.Chir.

[*December* 7, 1934]

REPORTS OF CASES PREVIOUSLY SHOWN

(I) Fixation of Cords in a Case of Exophthalmic Goitre.—T. B. LAYTON.

Kate M., now aged 58, was shown at the meeting of the Section, held May 6, 1921, as a case of bilateral abductor paralysis in exophthalmic goitre (*Proc. Roy. Soc. Med.*, 1921, xiv, Sect. Laryng., 55). The late Dr. William Hill expressed the opinion (unpublished) that the condition was one of fixity of the crico-thyroid joints rather than a paralysis. Time proved him to be correct, and the fixity became more marked until tracheotomy became necessary. The patient wears a tube with a pea-valve.

This case is shown in order to raise a discussion on the physical signs of fixation of the joints as distinct from paralysis of the cords.

Discussion.—HERBERT TILLEY recalled the case of a man upon whom he had performed an urgent tracheotomy about thirty-seven years ago, for bilateral adduction of the vocal cords. Beyond some swelling of the mucous membrane covering the arytenoid cartilages, no other laryngeal lesion was to be seen, nor was it possible to discover any central or peripheral lesions involving the origin or distribution of the recurrent laryngeal nerves. The patient had been kept under periodical observation for some thirty years, during which time he remained at work but had been unable to relinquish the tube, which did not prevent him from speaking with a fairly good, though husky voice. During that period his general health had been excellent. The case might therefore be regarded as one of mechanical immobilization of the vocal cords, probably due to inflammation of the crico-arytenoid articulations.

A few years later, a medical man was seen for huskiness and pain on speaking or swallowing, with slight dyspnœa and stridor on exertion. His temperature was 101·4° F. and walking caused pain in the knee-joints and ankles. The left arytenoid region was much swollen, and the vocal cord motionless in the mid-line. He returned home, and passed through a sharp attack of rheumatic fever; two months later all the laryngeal structures were normal and his natural speaking voice had returned.

These experiences led in 1918 to communication with twenty-three cases of vocal cord immobility seen during the preceding ten years. From ten patients no reply was received; they had probably died from some grave primary lesion which involved the corresponding recurrent nerve. Of the remaining thirteen, six had completely recovered the use of the previously immobile cord, three had died, and four remained in *statu quo ante*.

The deduction which might be drawn from these observations was that fixation of a vocal cord in the position of adduction did not necessarily imply a grave prognosis, although it would always be one's duty to exclude those factors which gave to an immobile cord its peculiar and often serious clinical significance.

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HAROLD BARWELL asked the reason of the remark that time had shown the diagnosis of fixation of the cord to be correct. It still looked like an abductor paralysis. There was no sign of scarring or old infiltration, so far as he could see, in the neighbourhood of the joints, and there was a little movement of the arytenoids on attempted phonation. He thought that in many of these old-standing paralyses the cords gradually became fixed from contraction of the fibres of the capsule of the joint, and of the muscles, but that paralysis was the primary cause of the condition.

P. WATSON-WILLIAMS remarked that in this patient, on phonation the right arytenoid adducted and rode over the left arytenoid which, being fixed, was not displaced; an example of the difference between fixation and paralysis, since, with a left cord merely paralysed but the arytenoid not fixed, the arytenoid would be pushed aside by the more active opponent on the other side. That was a point in the diagnosis of these cases. Further, in this case the cord on the left side was broader than that on the right side and was at a different level.

T. B. LAYTON (in reply) said that the great point in the differential diagnosis of unilateral paralysis from fixation of the crico-arytenoid joint was that when the normal cord came back and hit the arytenoid, in paralysis the cord moved the arytenoid, but in fixation it slid in front or above. In the present case the left cord and arytenoid were totally fixed, but there was some movement on the right side. As that arytenoid came back and hit the other one, it slipped in front.

The question was, if one was sure there was a bilateral abductor paralysis due to definite paralysis of the nerves, was it not always a very serious lesion? Did any of those patients live as long as this patient had? In the cases described as living for many years he suspected that it was a disease of the joint, as distinct from primary paralysis.

(II) **Basal-celled Carcinoma of the Palate.**—H. BELL TAWSE.

Mrs. A., aged 42. Shown at meeting of the Section held on March 14, 1927 (*Proceedings*, 1927, xx, 42).

Report of microscopic section, April 8, 1927 (*ibid.*, p. 63).

Report of Research Committee (*ibid.*, p. 115).

Shown at meeting of Section, May 3, 1929 (id., 1927, xxii, 41).

June 6, 1927: 25 mgm. radium inserted into growth in palate for twenty-four hours.

March 3, 1934: Seven ½-mgm. radium needles inserted in palate for seven days. Patient has nasal polypi which can also be seen hanging from the sphenoidal ostia.

Discussion.—The PRESIDENT said he thought there might be a slight recurrence on the left side.

H. BELL TAWSE (in reply) agreed that there was now a slight recurrence on the left side, at the junction of the hard and soft palate. On previous occasions when there were recurrences, their progress was very slow. Radium needles were employed, and they were passed into the substance of the palate and anchored with silk sutures.

CASES

Impaired Mobility and Chronic Inflammation of the Left Vocal Cord and Ventricular Band.—H. BELL TAWSE.

Rev. W. D., aged 49. Two years ago almost complete loss of voice followed a bad cold, and he had to give up work for four months. Complete restoration of voice.

Last March he had a similar attack, and although he returned to work after a few weeks' rest, his voice was never normal. Hoarseness became more marked last September, and he was unable to preach.

September 11, 1934: Very hoarse. Some tenderness over left ala of thyroid cartilage. No enlarged cervical lymphatic glands palpable. Marked limitation of movement of left vocal cord, which is obscured by the swollen, congested, ventricular band. Left arytenoid moves sluggishly. Small area of erosion at the junction of vocal cord and arytenoid.

The right vocal cord appeared normal. Some inter-arytenoid thickening. Chest clear. No sputum. Wassermann reaction negative. No improvement from one month's administration of potassium iodide.

Two Cases of Pre-cancerous Epitheliomatosis (Bowen's Disease) of Palate and Fauces.—WALTER HOWARTH.

(I) F. T., male, aged 56, has been under my care for fifteen years. During that time the condition has markedly improved after light diathermic cauterization, but it usually recurs—often, however, in a different place. At one time the tongue was extensively affected, but it is now clear. The lesion on the lip is a recent manifestation.

(II) A. G., male, aged 60, has been under observation for six months, but the condition has been present for more than three years. Only recently has it become painful. No treatment has been given as yet.

In both these cases there is a marked similarity between the multiple, papulo-squamous, hyperkeratotic, tumour-like lesions, and this clinical appearance is associated with a very characteristic histological picture. Microscopical examination of portions removed suggests that the condition is one which closely resembles the pre-cancerous dermatosis of Bowen.

Discussion.—F. HOLT DIGGLE said it must be difficult to decide when such a condition passed from the precancerous to the cancerous state. Case II was already carcinomatous; he thought the glands in the neck were involved, and the histology seemed typical of squamous-celled carcinoma.

D. R. PATERSON said that he had seen two such cases, and they much impressed him. One patient was a man who went on for five years, and finally the hard palate perforated into the nasal cavity. The other, a woman, ultimately developed infiltration of the pyriform sinus.

In both cases the disease began on the inside of the cheek, fauces and soft palate, and was confined there for a long time. Various applications improved it, and when it assumed a warty appearance the removal of small pieces from time to time helped. Its activity used to change from one side to the other, until finally it settled and extended, notwithstanding repeated removals. Specimens were examined from time to time by the pathologist, but only in the later stages were the cases regarded as malignant.

H. BELL TAWSE asked whether the exhibitor would try radium needles in the lesion of the lower lip, in order to see whether the effect was more rapid and more lasting than that of diathermy.

LESLIE POWELL said that he had seen a similar case on the previous day. The patient had come to him originally nine years ago, with a large ulcer of the palate on the left side, involving the antrum. He thought it was malignant, and treated it with diathermy, but the pathologist said it was inflammatory. Two years afterwards she came again. This time he was sure it was malignant, and he accordingly treated her with radium in the antrum, and applied diathermy to the palate. It was reported to be epithelioma. She had been well until a year ago, but now she had a nodule in the palate, and several subcutaneous nodules in the cheek.

WALTER HOWARTH (in reply) said the first case he showed had been under his care many years, and had been treated by diathermic cauterization over a period of years. Not until this year did he see the second case. Then in a few weeks he saw a private patient

with the same lesion. When the section from the private patient was examined by Dr. Philip Panton he drew attention to the curious histological appearance; the speaker took sections from the other cases, and the histological picture was the same in each. It was on all fours with the precancerous dermatosis described by a Boston dermatologist in 1912. He had not found any reference to this condition occurring in the mouth, but in several cases the lesion was described as being seen on the vulva and the vagina.

Dr. Paterson's cases must, according to what he said, be identical. It seemed that these cases could persist for years—as long as twenty years—without showing any malignant change. He agreed with Mr. Diggle that the lesion was probably, in its deeper parts, malignant, as there was a hard gland on the right side. He intended to adopt Mr. Tawse's suggestion to put radium into the lip in the first case, as diathermy might cause a scar, and radium would give a better result.

Lingual Thyroid.—HAROLD KISCH.

Female, aged 26, was seen in June 1934 complaining of a sensation of thickness in the throat, with difficulty in speech and swallowing. The symptoms had been coming on gradually for two years. Previously there had been no symptoms, and apart from her physical under-development, she had had a normal childhood. There was a smooth, hemispherical, elastic swelling, the size of a pigeon's egg, at the root of the tongue. The trachea was very easily palpable in the neck, and no thyroid gland could be detected. Intelligence was good but there were signs of hypothyroidism. It was considered advisable to avoid operation, and to try to obtain reduction in size by X-rays. The treatment was carried out by Dr. Gwenda Hilton, under the direction of Dr. R. W. A. Salmond, at University College Hospital.

The following are the details: Portals of entry—right and left lateral (6 by 8 cm.). Daily dose 200 r (190 kv. 7 ma., 1·5 mm. copper filter) to one field. Total dosage: 1st course 2,000 r to each field; 2nd course 1,800 r to each field.

The tumour has diminished, and the symptoms have been relieved.

Discussion.—MUSGRAVE WOODMAN remarked that he had not seen this patient, but was interested in the treatment which was adopted. He had seen several cases of thyroid rest in the mouth or in the region of the hyoid bone, and these he had always treated surgically. He wondered why Mr. Kisch adopted ray therapy here. Presumably it was because of hypothyroidism and the absence of a palpable thyroid in the neck. Was the object of applying deep X-rays to cause fibrosis? He also asked whether Mr. Kisch had considered the possibility of excision, and, if he considered the patient was deficient in thyroid, whether grafting a piece of thyroid in the neck, in a more comfortable place for carrying it, would not be the better practice.

HERBERT TILLEY said that last February he had seen a male Indian student, aged 35, with a lingual thyroid which caused slight difficulty in breathing at night and occasional spitting of blood. The speaker had discussed the prognostic surgical aspects of "lingual goitre" with Professor William Wright (London Hospital) and had received written communications on the same subject both from him and Dr. Alex. Low (Professor of Anatomy, University of Aberdeen).

> Professor Wright: "I am sorry I cannot give you a definite answer to your question which I understand is 'With thyroid tissue at the base of the tongue, can one conclude that there will be no thyroid tissue in the usual place in the neck?' There is no reason why, in view of the way the thyroid develops, there should not be thyroid tissue in both places and also in intermediate positions—for as you know, the thyroid develops as a median structure dividing more or less into two lateral parts as it meets the main vessels of the neck, and is drawn back by them in the backward movement of the heart. The parts are then divided and subdivided into lobules by mesenchymatous tissue. All this happens in the 5-mm. stage when cells are relatively undifferentiated, and as you can imagine, anything may happen.
>
> "I realize that this doesn't answer your question but it justifies a *caveat* against concluding that in any particular case the lingual thyroid is all the thyroid which is present."

Professor Wright then sent my question to Professor Low, who was about to publish a paper entitled "Abnormal Position of the Thyroid Gland" and he kindly forwarded to me a photograph of one of his specimens, which showed two nodules of thyroid tissue behind the posterior pharyngeal wall—with the accompanying note:—

> "The two aberrant thyroids seemed rather compressed against the lateral wall of the pharynx, but histologically the follicles appeared in every way normal and there was a small amount of undifferentiated thyroid tissue which one would assume might proliferate and give rise to thyroid tissue. Their vascular supply was provided by branches of the lingual arteries."

Professor Low's findings might prove of practical value if it could be shown that post-pharyngeal thyroid gland tissue was frequently present when the lateral cervical lobes were absent and a lingual thyroid called for some form of surgical treatment. In such circumstances, some degree of compensatory hypertrophy might be expected in the nodules behind the pharyngeal wall and, at the least, minimize the amount of post-operative thyroid medication.

H. KISCH replied that he chose X-ray therapy because when he first saw the patient she was so frail that he thought she would not survive a surgical operation, but something had to be done as she could scarcely swallow, and her voice was much affected. Dr. Salmond agreed to try the effect of the rays, and the result was that she could swallow comfortably and her voice was normal. Operation would probably have been followed by myxœdema.

Skiagrams and Lantern Slides of Partial Thoracic Stomach.—H. BELL TAWSE.

D. R., a well-developed girl of 14, had recurring attacks of vomiting of sudden onset and abrupt termination, since the age of 6 years. It was regarded as cyclic vomiting. The intervals and the severity varied greatly. When first seen in January 1931 she had lost 1½ st. in weight in a few weeks.

Radiological report: No evidence of abnormality in chest or mediastinum. There is very marked delay in swallowing at about 2 in. above the cardia, with dilatation of the œsophagus above this. Appearance suggests simple fibrous stricture or spasm. It is not, however, usual to see spasm in the œsophagus at this level.

Œsophagoscopy showed a tight stricture commencing about 12 in. from the teeth. This was with difficulty dilated up to No. 20 (Jackson). Two days later she could swallow with ease anything solid.

No serious recurrence till May 10, 1933, when dilatation again apparently cured her vomiting. Radiological report: Hurst's tube obstructed about 3 in. above cardia. No evidence of malignancy. Condition appears to be due to fibrous stricture. Situation unusual for cardiospasm.

Another recurrence November 1933. Radiological report: With the patient in the Trendelenburg position the barium ran back from the stomach and filled the œsophagus. Stricture seen about 3 in. above the cardia. Below this there was a dilated, intrathoracic portion continuous with the stomach. There is constriction at the level of the diaphragm, but no evidence of sphincter here. This intrathoracic part of the canal appeared to fill more easily on expiration, suggesting that the constriction is due purely to the muscular action of the diaphragm. Radiological appearances suggest congenital short œsophagus with partially thoracic stomach.

MUSGRAVE WOODMAN asked whether any information could be given concerning the mucous membrane beyond the stricture. It would be informing if a section could be made to ascertain whether it was columnar-celled. He asked why there should be violent spasm.

H. BELL TAWSE said he was unable to answer Mr. Woodman's question; he could not get a view of the mucous membrane beyond the stricture. Immediately the dilator was removed the passage closed up again, and he was afraid that serious damage might occur if he forced a tube through the stricture. Now that the radiological examination had shown

that the stricture was most probably the cardiac sphincter in spasm, he would certainly pass a tube through it, and if there was any doubt about the lining being gastric mucous membrane, he would remove a piece for examination.

Although partial thoracic stomach was a very uncommon condition, he thought that more cases might be forthcoming if the Trendelenburg position was employed in radiography of patients suffering from persistent regurgitation of food.

Chondroma of Posterior Edge of Vomer.—JOHN F. SIMPSON.

Male, aged 33, complained of slight nasal obstruction, first starting about twelve months ago. This was associated with a feeling of discomfort in the back of the nose. At that time, there was an unsuccessful attempt at removal of what was thought to be a polypus in the post-nasal space.

Posterior rhinoscopy shows an expansion of the posterior edge of the vomer by what appears to be a chondroma, which is almost filling the right posterior choana, and, to a less degree, the left. X-ray examination shows an indefinite shadow in the position of the tumour.

No operation is proposed until the tumour has enlarged sufficiently to give more definite symptoms.

Nasal Infection with Postural Proptosis.—A. LOWNDES YATES.

Female, aged 49, had suffered for four months from painless proptosis of the left eye, with slight upward displacement. The proptosis was increased by bending forward, and diminished when the head was bent back. For an indefinite period she had noticed slight left-sided nasal catarrh. The visible signs within the nose and nasopharynx suggested an infection of the antrum, as did the illumination.

The proptosis disappeared after the left frontal sinus had been washed out by soft catheter and the left antrum by proof puncture, the frontal sinus yielding half a drachm of muco-pus and the antrum about $2\frac{1}{2}$ drachms of more purulent material.

When the left antrum was injected with lipiodol, the skiagram showed a filling defect but no evidence of any fistula into the orbit.

E. BROUGHTON BARNES said that when the patient bent her head to her knees, marked proptosis occurred in twenty seconds, with swelling of the eyelids, which disappeared in about half a minute on sitting up again. He thought it possible that she might have a cavernous nævus of the orbit, and he would be cautious about doing anything to the antrum.

Clinical Section

President—E. G. SLESINGER, O.B.E., M.S.

[*December* 14, 1934]

Inflammatory Dislocation of the Atlas from the Axis.—DUNCAN C. L. FITZWILLIAMS, C.M.G., F.R.C.S.

M. Mc.T., a girl aged 6 years, admitted to hospital with severe wryneck.

History.—Mumps in August 1933, and two weeks later acute pain in the neck. A wryneck developed which grew worse until the child's neck was close to her right shoulder and chest. No reason could be found for this and electrical treatment was given. She was seen by an orthopædic surgeon. The condition was thought to be hysterical. After several weeks' treatment by gymnastic exercises she was put in

FIG. 1. 25.9.34.

plaster for six weeks, the head being straightened as much as possible, but there was no improvement. She was treated by massage and exercises without result, till March 1934. She was then examined by X-rays, but nothing was discovered. In May a second X-ray examination was made and a dislocation was suspected, but later this view was discredited. Another surgeon treated her by diathermy, till August. A year after the onset of the trouble she was still carrying her head in her hands.

She was brought to me in September 1934. There was a marked right wryneck, but without pain, and some improvement in the position had taken place. A prominence could be felt in the pharyngeal wall. A skiagram (fig. 1, p. 19) clearly showed a dislocation of the right articular process of the atlas on the axis, and she was admitted to St. Mary's Hospital for attempts to be made at reduction.

On October 16, under anæsthesia, forcible attempts were made to reduce the dislocation. Some adhesions were felt and heard to give, and the position of the head improved. She was put back to bed and suspended by a stirrup under her

FIG. 2. 26.12.34.

occiput and chin, with the head of the bed raised two feet. Several more unsuccessful attempts were made at reduction. An acute sore throat developed, and it was hoped that this might bring about a softening of the bone by an absorption of the calcium, such as had caused the dislocation to take place, but even wrenching with almost complete suspension by the head failed to reduce the dislocation.

Now the position of her neck is very much improved but a slight degree of wryneck is still noticeable (fig. 2). She has been suspended by the head for two months but I do not think I shall reduce the dislocation, and I hesitate to try an open operation because the spinal column may adjust itself to the new conditions as the child grows older.

Syphilis of the Lung and Aortic Regurgitation.—ERNEST FLETCHER, M.B.

H. D. M., male, aged 62, pensioner, complains of dyspnœa and occasional blood-streaked sputum.

Previous history.—Gastro-enterostomy 1929, for duodenal ulcer. No history of venereal disease.

History of present condition.—Well till February 1934, when he was admitted to his local hospital on account of increasing dyspnœa. The physical signs led to a diagnosis of pleural effusion on the right side. Some fluid was aspirated and found to be straw-coloured and clear. Eventually he was discharged, improved, in August. The dyspnœa, however, became more distressing, and on 3.10.34 he was admitted to Queen Mary's Hospital.

Condition on admission.—Cyanosed but not orthopnœic : dyspnœa noticeable at rest, and becomes urgent on exertion. States that he occasionally brings up blood-stained sputum. General condition fair ; clubbing of fingers.

Tongue : Furrowed. Chest : Signs of fluid in the right chest, left lung apparently normal. Heart : Apex beat 4 in. from mid-sternal line, right border not determined. Second aortic sound replaced by a diastolic murmur conducted down the sternum. Blood-pressure 140/60. Abdomen : Gastro-enterostomy scar. Liver felt one finger-breadth below the costal margin. Limbs normal. Urine normal.

Skiagram : Shadow over whole of right lung. Heart displaced to left, as also is the aorta, which is wide. No aneurysm present.

Wassermann reaction + + + +. Temperature, pulse-rate, and respiration-rate normal, with small variations.

An attempt was made to induce an artificial pneumothorax, so that the parenchyma of the right lung might be visualized. The pleura was found to be enormously thickened, probably being as much as ¾ in. thick. Air was introduced on three occasions ; eventually no more could be passed into the pleura. The pressure was raised to 50 cm. of water, but on opening the cock of the needle, the amount introduced blew out again. It is evident that the pleura is completely adherent in several places.

A skiagram taken after the artificial pneumothorax showed numerous fluid levels all over the right lung, but the parenchyma could not be visualized, and it is probable that the thickness of the pleura precludes this.

Lipiodol examination : The upper lobe bronchus could not be visualized on the right side. The lower and middle lobes are apparently collapsed, and the lower lobe lies in the paravertebral gutter. The left lung is practically normal.

A full course of anti-syphilitic treatment has been given, and the Wassermann reaction is now + +.

Pathological investigations.—Pleural fluid : Straw-coloured fluid with clot.

Cytology : A few polymorphonuclear and endothelial cells. Lymphocytes present in small numbers. Gram film : No organisms. No T.B. seen. No growth on culture.

Sputum : Pneumococci and *Micrococcus catarrhalis.*

Blood-sedimentation rate : At one hour, 57 mm. At twenty-four hours, 63 mm.

Dr. J. N. O'REILLY wondered whether Dr. Fletcher had considered the diagnosis of endothelioma of the pleura. He saw no reason for connecting the lung condition with the cardio-vascular syphilis.

Columnar-celled Carcinoma of the Cæcum in a Young Man.—TERENCE EAST, M.D.

Patient, male, aged 21. Few weeks' history of pain in the right iliac fossa. Here a tender lump could be felt. Over it the cæcum was distended and bulging. Peristalsis could be seen. In spite of the patient's age, it is suggested that the lump is a malignant growth. Barium enema showed filling defect of the cæcum.

Later.—Mr. H. L. C. Ward has operated and found a malignant growth. Section of a gland removed showed columnar-celled carcinoma.

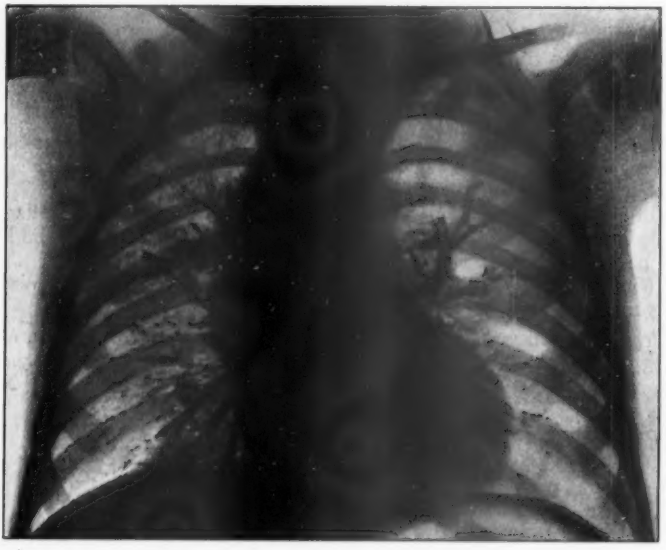
Mediastinal Dermoid.—R. W. B. Ellis, M.D. (for E. A. Cockayne, D.M.).

C. V., male, aged 2 years 7 months. Admitted 6.11.34 with history of dry cough during summer 1934, worst at night. Tonsils were removed in August 1934; there has been some improvement in the cough since then, though the child still has occasional nocturnal dyspnœa.

History.—Operation for inguinal hernia, August 1933; pertussis, April 1933; diphtheria followed by pneumonia, November 1933; measles followed by pneumonia March 1934.

Family history.—Irrelevant. One other child (well).

On examination.—Well-nourished; good colour. No clubbing or cyanosis; no dyspnœa when at rest. Apex-beat in fourth space in nipple line. Impaired percussion note over manubrium sterni, and in first and second interspaces immediately to right of sternum. No other physical signs of disease.



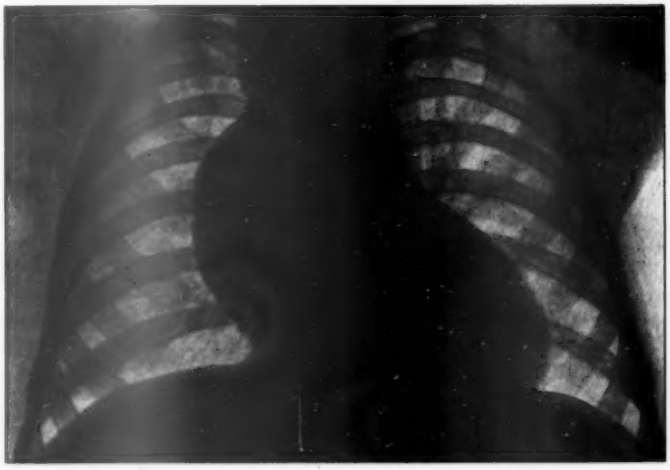
Lipiodol injection: no displacement of trachea or bronchi.

Blood-count (7.11.34).—R.B.C. 4,360,000; W.B.C. 16,500; Hb. 85%; polys. 38%; large lymphos. 23%; small lymphos. 29%; monos. 6%; eosinos. 3%; plasma 1%.

Skiagram (26.9.34).—Large opaque mass with a well-defined, rounded margin, extends from the mediastinum into the right lung field. *Under the screen*: The upper part of the mass does not pulsate, and appears distinct from the cardiac shadow. *Bismuth swallow*: No deflection of œsophagus. *Lipiodol injection*: Normal distribution without displacement of trachea. Both lungs filled well.

Discussion.—Dr. J. L. LIVINGSTONE said that he thought the mediastinal shadow was too oval in shape, and situated too far posteriorly for the condition to be one of dermoid cyst. The fact that the shadow could be seen to the left of the aortic arch was also against this. He gave the diagnosis of enlarged glands, inflammatory rather than tuberculous, as the Mantoux test was negative.

Dr. ERNEST FLETCHER said that there appeared to be three possibilities in regard to diagnosis: (1) Cardiac aneurysm, (2) a mediastinal dermoid, (3) adenitis of mediastinal glands. A cardiac aneurysm in a child of this age must be extremely rare, and from the position of the radiological shadow, would probably be an aneurysm of the right auricle. This seemed to be the least likely solution of the three. If the shadow was due to enlarged glands, it did not appear that any of the more usual groups of glands were involved. Enlarged mediastinal glands were comparatively common in the chest and might be due to any of the causes of enlarged glands in other parts of the body, perhaps most noticeably to tuberculosis or lymphadenoma. The glands affected were usually the tracheobronchial or paratracheal groups and the shadow thrown occupied the upper or middle mediastinal zone. In this case, the shadow occupied the lower mediastinal zone and although it was of a very considerable size, there was apparently no interference with the patency of the bronchi.



Mediastinal tumour extending into right lung field.

The last alternative, a mediastinal dermoid, seemed on the whole to be as likely as any of the others, but must be even rarer than cardiac aneurysm.

Dr. ELLIS (in reply) said that the diagnosis of mediastinal dermoid was admittedly tentative, but appeared more likely than that of any cardiac abnormality owing to the behaviour of the opacity under the screen, and the appearance of the later radiograph. The oval shape of the opacity was possibly more apparent than real, owing to its merging with the cardiac shadow.

Traumatic Arthritis of the Hip; Relief of Pain by Epidural Injection.—GERALD SLOT, M.D. (shown by P. M. DEVILLE, M.R.C.P.).

E. C., aged 22, while undergoing physical training in the Army, fell on to his feet and then backwards on to his buttocks, in vaulting a horse. He was treated, at a military hospital, for contusion of the right hip, by massage and radiant heat, but as

by August 1933 there was no improvement he was manipulated and the sciatic nerve was stretched. Five months later, as the pain still continued, an injection of saline into the nerve was given, and was followed three weeks later by an injection of oxygen. Between then and July 1934 the patient was still having massage but there was little, if any, improvement. He was finally invalided out of the Army. He obtained employment as a lorry-driver but had to give this up owing to the pain which had now become worse in the buttocks and hip. On attending hospital in October 1934, he was examined by X-rays, but no definite lesion was found. In view of the pain, and of the failure of all the treatment he had so far received, it was decided to inject, under evipan anæsthesia, 100 c.c. of normal saline with 1% novocain into the epidural space, through the sacrococcygeal foramen. It is now some two months since he had this treatment, and during this time the pain has completely disappeared. He still has impairment of movement, but the freedom from pain allows him to walk reasonably well.

Several other cases of osteo-arthritis of the hips have been treated by this method, and although it apparently has no effect on the arthritic process as such, it has been efficacious in the majority of cases in relieving the pain, which after all is generally the patient's chief complaint. It seems that this method is worthy of a more extensive trial, in cases resisting the more usual forms of treatment.

Facial Hemiatrophy.—A. B. STOKES, M.R.C.P. (By courtesy of DR. TERENCE EAST.)

Patient is a girl, aged 13, otherwise well developed.

Hemiatrophy is on left side and limited to face. First noticed three years ago, when lip-groove appeared. Groove appeared on forehead six months ago, and on cheek four months ago. The grooves are shown in the photograph.

Left malar appears flat, with a hollow below; left eyebrow drops; nasal septum deflected to left. Left maxillary teeth rather crowded; mandible appears to be normal. Tongue is doubtfully smaller on left side. There is apparently no other intra-oral or intra-nasal asymmetry. Skin over left forehead shows band of yellowish pigmentation extending back to hair margin and encroaching a little into right side. Hair of head and eyebrows is symmetrical. The eyes appear symmetrical in every particular including the discs, iris pigmentation, and lachrymation. Ears symmetrical.

No evidence of left-side weakness of 7th or 5th cranial nerves. Sensation over the left face is normal. The mentality is normal.

The atrophy therefore appears to involve primarily the soft tissues of the face, particularly the subcutaneous fat. There is no evidence of a trigeminal interstitial

Gumma. ? of Parotid Gland.—F. W. WILLWAY, M.S. (for C. P. G. WAKELEY, F.R.C.S.).

Sydney F., aged 44. Complains of "lump in right side of cheek since March 1934, following extraction of two lower molar teeth." Recently this has grown much larger.

On examination.—Swelling under mucous membrane on buccal aspect of right cheek, about the size of a cherry. Hard; well defined; not tender. Appeared to have come from the parotid gland. Dusky macular rash over forehead.

Special examination.—A probe slips easily down the duct into the parotid gland. The gland can be seen to secrete normally.

Wassermann reaction: positive.

Biopsy: Squamous epithelium under which the tissues show considerable chronic inflammatory changes. No parotid tissue seen.

Facial hemiatrophy.

neuritis, or of a cervical sympathetic lesion. There is no associated sclerodermia or migraine.

Dr. J. N. O'REILLY considered that the involvement of the tongue and palate excluded the diagnosis of lipodystrophia. He agreed with Dr. Stokes' diagnosis.

Retrogression of a Malignant Tumour in a Child.—G. H. NEWNS, M.D.

K. N., male, aged 5 years 10 months, admitted to King's College Hospital, November 12, 1934, suffering from lobar pneumonia (right lower lobe); course unusually prolonged, with high swinging temperature and severe mental disturbance. Resolution delayed, but eventually complete.

On examination.—Besides lung condition, firm nodular mass felt in right loin in situation of the kidney, from which it was thought to emanate. Left kidney not palpable; no abnormal tumours could be felt elsewhere.

Past history.—Laparotomy at age of 9 months at Belgrave Hospital; large right-sided abdominal tumour was present, which, according to the mother, was visible through the abdominal wall. At operation the tumour was found to be a renal sarcoma, adherent to the intestine and quite irremovable. A small piece was taken for microscopical examination.

Pathological report.—The section consists of a mass of sarcoma-like cells embedded in a loose stroma. They are not typical of either round or spindle-celled sarcoma. The cells vary considerably in size, some being very large: there are a few giant cells. The cytoplasm is pale-staining and has a vacuolated appearance. The tissue is actively growing, for there are many mitoses. The section is one of a malignant tumour, probably an embryoma or Wilms tumour.

A hopeless prognosis was given.

After discharge from hospital the child eventually became quite well and has remained so ever since.

Investigations.—Blood-count (taken on day following admission): R.B.C. 5,240,000; Hb. 98%; C.I. 0·94; leucos. 13,000; polys. 84%; lymphos. 14%.

Intravenous pyelogram: No dye excreted by right kidney; pelvis of left kidney and left ureter normal.

Comment.—The points arising out of this case are as follows:—

(1) What was the nature of the original tumour? Its situation, its large size, the fact that it was inoperable, together with the evidence of the section, are strongly in favour of it having been malignant.

(2) What is the nature of the present tumour? The pyelogram shows that the right kidney is functionless, and in view of the small size of the tumour, it is probable that it consists merely of the fibrous remnants of the kidney.

(3) It is submitted that there is strong evidence that this is a case of spontaneous retrogression of a malignant tumour. The tumour has markedly diminished in size, and in view of this and of the good condition of the patient, there is probably no actively malignant tissue present now. It is realized that well-authenticated cases of retrogression of a malignant tumour are very rare, but it may be that this is such a case.

(4) What treatment is indicated? An attempt at removal might stimulate latent malignant cells into activity; on the other hand, if the tumour is left it may begin to grow again, even after so long an interval as five years. On the whole it seems wiser to leave it alone.

Dr. J. N. O'REILLY said that with regard to the question of decrease in size of the tumour, two points arose. The first was that the tumour present would occupy a relatively much larger space in the abdomen of a baby of 9 months. The second point was that although it had been shown that there was now no functional kidney tissue on that side, the possibility of a hydronephrosis having been present and having increased the size of the original tumour should not be overlooked.

[Dr. W. M. FELDMAN'S case of **Transposition of Viscera,** shown at this meeting, will be published in the next issue of the *Proceedings* of the Section.]

JOINT DISCUSSION No. 1

Section of Epidemiology and State Medicine and Section of Obstetrics and Gynæcology

Chairman—J. D. ROLLESTON, M.D. (President of the Section of Epidemiology and State Medicine)

[*November* 23, 1934]

DISCUSSION: HOW CAN THE RESULTS OF ANTE-NATAL CARE BE IMPROVED?

Dr. Isabella D. Cameron: Ante-natal care, in the best sense of the term, is supervision of the general health and obstetric condition of the expectant mother, sympathetic guidance in her mental and emotional readjustments, and instruction in her new duties and responsibilities. The high hopes of its early advocates have not been realized in their entirety. It may be that those advocates hoped for too much; it may be that the present-day critics undervalue what has been effected. Dr. Ballantyne of Edinburgh directed attention to the possibilities of ante-natal work through his study of fœtal pathology; an earlier French worker in the cause of infant welfare instituted home visiting of expectant mothers by midwives.[1] Much pioneer work had been done in the years immediately preceding the official inauguration of ante-natal work in July 1914, when the Local Government Board issued a circular and memorandum in connexion with grants in aid of maternity and child welfare services. It is interesting to note that this Memorandum referred to an ante-natal scheme as organized "in its direct bearing on infantile death." May it not be that the early impetus given to ante-natal work from the point of view of the saving of infant life, and through the agencies organized for infant care, tended in some degree to lead to its development apart from midwifery, although Dr. Ballantyne himself clearly foresaw, in the care of the expectant mother, an unworked field of preventive medicine?

The ante-natal scheme as set out in the official Memorandum comprised:—

(1) An ante-natal clinic for expectant mothers; (2) the home visiting of expectant mothers; (3) a maternity hospital, or beds at a hospital, in which complicated cases of pregnancy could receive treatment.

Although many invaluable auxiliary services have been added to the scheme as originally drafted, the essentials of ante-natal work remain the same—clinical examination, home visiting of expectant mothers, and hospital provision for complicated cases of pregnancy.

It is a matter of common agreement that ante-natal work should be closely associated with attendance at confinement and during the lying-in period, and that the personnel should, where practicable, be identical. Indeed, we appear to be

[1] Moore, S. G., *The Milroy Lectures*, 1916. "Infant Mortality," p. 38. Reprinted from the *Lancet*, 1916, i, 849, 895, 943.

within sight of a form of retaliation by obstetricians for the earlier invasion of their sphere by infant-welfare workers in a movement for extension of the maternity service, so as to include the first few weeks or months of the infant's life. An initial difficulty in the definite incorporation of ante-natal work in a maternity service is the difference—one might even say, the cleavage—of opinion as to the best methods of provision for confinement and lying-in.

Widely different points of view would doubtless be elicited if all present replied to the questions :—

Is confinement at home or in an institution the better practice?

Who should be responsible for the conduct of a normal confinement—a midwife or a doctor?

Is a joint-service by doctors and midwives desirable and practicable?

What training and experience are essential in the obstetric practice of doctors?

Is a new form of speciality in maternity work to be encouraged, or are general practitioners best fitted to undertake the major part of obstetric practice?

What is the rôle of the obstetric consultant?

If in-patient treatment is the ideal, what type of institution is required?

We now have voluntary and municipal maternity hospitals and homes, maternity departments in general hospitals—some of which equal and even exceed maternity hospitals in size—and many private nursing institutions in which maternity patients are treated. There has been a recent increase in the use of maternity beds in most areas in the country and in all classes of society. This is probably due, in the main, to social and economic influences. It is impossible to predict how far this practice will become stabilized as an accepted custom, although it has already led to a material increase in the numbers of beds available. This popular movement towards in-patient treatment of normal, as well as of abnormal, cases must be kept in mind in considering how best to link up ante-natal supervision with attendance at confinement.

Great diversity is found in the methods of organization of ante-natal clinics, and in the degree of association with attendance at confinement. The extreme lack of coördination is found in some areas in which municipal ante-natal clinics, organized as part of maternity and child welfare schemes, are conducted independently of the ante-natal clinics which have been established at the maternity departments provided by the same local authority. Further confusion is introduced by the occasional divorce of home visiting of expectant mothers from their attendance at ante-natal clinics. In fact, no department of the maternity service of this country is in complete alignment with other departments. Little allowance is made in the present organization for the biological fact that pregnancy, labour, and lying-in are consecutive phases of one physiological process. Are good results of ante-natal care to be anticipated from such an ill-knit organization?

If the results of the actual working of ante-natal schemes are carefully evaluated, it is found that in home visiting, in clinical work, and in hospital treatment they fall far short of what might be achieved. Home visiting of the expectant mother is carried out to a considerable extent in most parts of the country, with a varying degree of success. It is at its best when definitely associated with the general supervision of the health and well-being of the patient, related to her domestic circumstances, and linked up with preparation for confinement, whether in her home by a midwife or doctor, or in an institution. But home visiting is too frequently unsystematic and lacking in clearness of purpose. A friendly call may be kindly and helpful, and its value is by no means negligible, but it cannot be an effective substitute for active interest and practical assistance and guidance in the difficulties, discomforts, and apprehensions that are frequently experienced by the pregnant

woman. Rightly and sympathetically conducted, home visiting is of unlimited value in establishing and maintaining a normal balanced attitude of mind in an expectant mother. Too many ante-natal clinics are still indifferently conducted, and in this criticism I venture to include a number of clinics conducted in maternity departments, nominally at least under the direction of obstetricians. Clinics are sometimes badly located in relation to the homes of the possible patients. Premises are often cramped, dull, and uncomfortable, and are lacking in suitable arrangements for privacy. In saying so, I do not forget that many existing institutions were erected before ante-natal work was begun, and that make-shift accommodation is frequently all that is practicable without heavy expenditure. The number of patients seen at an ante-natal session is sometimes so great that inadequate individual attention is given to them. The routine medical work is too often carried out by junior inexperienced members of the staff. Too little use is made of the opportunity of instructing the prospective mother in the principles of healthy living, and of assisting her in the detailed preparations for the infant which are of positive advantage to her health and to her emotional outlook. The social agencies available for the help of necessitous patients are too infrequently employed on their behalf. Much of the work of ante-natal clinics tends to be an eager search for the abnormal, to the neglect of endless opportunities for the support, encouragement, and guidance of patients who, fortunately, are passing through a normal pregnancy. A further defect of our ante-natal organization is that there are too few hospital beds available for the treatment of complications of pregnancy. This branch of work should be extended, both as regards the number of patients admitted for treatment, and in a wider interpretation of what abnormality in pregnancy is, particularly in the classes whose domestic circumstances make a few days' rest in bed in their own homes quite impracticable.

I have, so far, given my attention mainly to organized ante-natal work, but it is essential to keep in mind that a considerable proportion of the ante-natal work carried out in this country is in the hands of private practitioners. In the well-to-do classes ante-natal supervision is given by the practitioner, or by the consultant whom a patient has engaged to attend her at confinement in her own home or elsewhere. There are also more formal arrangements. With regard to insured women, the general practitioner is "responsible for medical attendance during pregnancy" and "for these women the ante-natal clinics should be available for any additional care the doctor considers necessary."[1] General practitioners are called in to give medical aid in abnormalities in midwives' cases under the rules of the Central Midwives Board. Revised instructions for the guidance of midwives in ante-natal work have recently been issued by the Central Midwives Board. In addition, a number of local authorities have established a general practitioner service for uninsured women who have engaged a midwife to attend them at confinement, as part of the maternity and child welfare scheme. This has been adopted mainly in sparsely populated areas where ante-natal clinics are not available, but it has also been put into operation in several towns. The family doctor is in a position to deal with a patient as an individual in her family and social setting; he knows her domestic problems and difficulties; he is familiar with her medical history. It is for others to speak of the standard of professional skill in obstetrics which can be maintained in the stress of busy modern practice. I learn from those with knowledge of the conditions of lower middle-class practice that in some districts the custom of charging a special fee for each ante-natal examination acts as a deterrent to many women of narrow means who would otherwise wish to have the advantage of constant medical supervision during pregnancy.

The routine of clinical ante-natal work, whether conducted in a formal clinic or in a patient's home by a doctor or midwife, covers only a part of the field, and it is

[1] *Ministry of Health Memorandum* 156 M.C.W., December 1930.

essential that it should be amplified, as necessary, by the various provisions now available under local maternity and child welfare schemes. These include consultant service, nursing assistance, hospital treatment, dental treatment, the supply of milk, service for home helps, arrangements for special examinations and for laboratory investigations, and the provision of sterilized outfits. These services are utilized increasingly and with benefit in ante-natal work but they are still too little known and used in suitable cases. No ante-natal scheme can be a success which is not approved and accepted by the women for whom it is provided. When an expectant mother is met in a spirit of friendliness, sympathy, and helpfulness she will avail herself of ante-natal care, and it is for those responsible for this service to see that an atmosphere of kindliness and goodwill is added to professional competence.

How are the results of ante-natal work to be assessed? If they are to be judged exclusively, as some would say, by an appreciable fall in the maternal mortality rate as the work is extended, failure must be acknowledged. But those who have given the closest attention to the complexity of the problem of maternal mortality are best aware how many and how varied are the factors that influence the rate. It may well be that the benefits of ante-natal supervision have been counterbalanced by other and adverse influences during the relatively short period that has elapsed since ante-natal supervision took an established place in obstetric work.

That benefits, both physical and mental, have been conferred on expectant mothers by supervision of their welfare during pregnancy is evidenced by the countless women who avail themselves of the provision for ante-natal care and subsequently encourage others to do so. In view of this support by the mothers of the nation, there seems no real cause for discouragement in the fact that results cannot be stated arithmetically or set out diagrammatically.

It is with a firm belief in the beneficence of ante-natal work that I submit for discussion that its organization should be reviewed and readjusted in relation to the maternity service as a whole, and that the detail of working of home visiting and of ante-natal clinics, and the further use of hospital beds should be reconsidered in the light of the defects which I have ventured to put before you.

Mr. G. F. Gibberd: The aims of ante-natal care are, presumably, to reduce maternal mortality, and maternal morbidity, and in other ways to improve the lot of the child-bearing woman. Definite figures are available for a concrete discussion on maternal mortality; the available "data" for a discussion on maternal morbidity are less well founded, so that matters of opinion tend to intrude themselves in place of matters of fact, and when we come to the "other ways" in which ante-natal care affects the mother, the results are almost entirely a matter of opinion.

It is probable, however, that measures which tend to reduce maternal mortality will have a beneficial effect on morbidity and also on less well-defined aspects of the patients' well-being, so that if we judge the results of ante-natal care by the effect on mortality, we are at least on firmer ground than if we judge them by other standards. I am aware of the value of the various minor services which ante-natal care provides, but to try to justify ante-natal care from its minor results may be merely a grudging apology for its failure in the major issue.

As long ago as 1922 Mr. Eardley Holland saw the direction in which attempts to improve the results of midwifery were moving, when he stated that "Ante-natal methods are the strategy, intra-natal methods the tactics, of obstetrics. There is . . . a tendency nowadays to exalt the strategy at the expense of the tactics." It is quite useless to regard ante-natal care as a separate part of midwifery. Improvement in the practice of ante-natal care will come as part of improvement in the practice of midwifery as a whole.

It is nowadays a common jibe at ante-natal care to point out that its more widespread employment has not reduced maternal mortality. This is not really a criticism of the principle of ante-natal care, but rather an acknowledgment of the fact that the type of ante-natal care which is being given is ineffective. It is generally a relatively simple matter to reduce the incidence of an accident from (say) 50% to 30%, but in the same circumstances to reduce an incidence from 0·5% to 0·3% is enormously more difficult. It calls, not so much for organization on the large scale, as for the highest grade of judgment in the individual case, and judgment of this order is an attribute of a relatively few individuals. That is why it is so difficult to reduce the maternal mortality in this country. It is already so low that its reduction requires a standard of obstetric wisdom on the part of each individual doctor or midwife which, in the present state of our methods of education, we can reasonably expect to find only in a very few.

I believe—though I might find it difficult to prove—that the results of midwifery in England were better in 1880 than in Smellie's day. I have shown that in a certain small area they were better in 1930 than in 1880, and as I do not believe that the art of midwifery has yet reached its zenith, I am encouraged to hope that they may possibly be better in 1960 than in 1930. But the lower the maternal mortality, the more difficult it is to lower it still further, and just as the problems of Braxton-Hicks were more difficult of solution than those of Smellie, so are our problems more difficult than those of Braxton-Hicks. Those who ask, "If maternal mortality is preventable, why not prevent it?" show by the very question their ignorance of practical realities. They have not learned that not only is perfection unattainable, but that the nearer we get to perfection the more tedious is the approach.

There are two ways in which we can attempt to improve the results of midwifery (including the results of ante-natal care) in this country. In the first place we can take the existing personnel, in whose hands the midwifery of the country rests, and by organization we can try to make the most efficient use of these people. We can give them better surroundings in which to work, and we can provide the necessary accessories for their work, but whether we organize or not, the personnel remains the same. A great deal has already been done on these lines, but the problem of reducing a mortality which is already as low as 0·5% is so great that I do not think organization, by itself, is likely to produce any striking result.

The other approach to the problem is to try to raise the standard of obstetrics, as practised all over the country, by improving obstetric education. I do not mean that I think the standard is at present low, or that it is simply a matter of applying greater care or of spending more money. The further reduction of maternal mortality is such a difficult thing that all the care and all the money in the world will not avail unless the obstetric judgment of the individual accoucheur is of an order which we now expect only of the relatively few who have had special experience. An ante-natal clinic, a maternity hospital, a sterile towel, a pint of free milk, or a lecture on how to knit a pair of pilches,—none of these will prevent maternal deaths, unless it is backed by men and women wisely and extensively trained.

There is no time, and this is not the place, to indicate the lines upon which obstetric education can be improved, but I believe that if as much energy and money were expended upon education of doctors and midwives as has already been spent on organization and public services in midwifery, we should in twenty years time have a generation of men and women accoucheurs whose greater knowledge and sounder judgment, applied to ante-natal care, might enable us to show that this branch of midwifery can, after all, help to reduce maternal mortality. This is a long way ahead, but the nature of the problem makes it futile to hope for quick results, and I believe that the disappointment over the failure, so far, to reduce

maternal mortality is merely an expression of the failure to appreciate the difficulty of the problem.

In a public speech on November 13, 1934, Lord Moynihan is reported to have said: "Puerperal sepsis, in my judgment, is invariably preventable, and if preventable, why not always prevented." I quote this statement as typical of the man or woman who thinks that the problem of maternal mortality is essentially simple. I have tried to show that, because we start off with a mortality rate as low as half of 1%, the problem is essentially extremely difficult, and it is the greatest disservice to the women of England to underestimate the difficulty, for by so doing we are led to seek an easy remedy, and to risk disappointment in the result. We have, to some extent, already tried the easy way in ante-natal work. We have tried the effect of organizing ante-natal care. What we must try in the future is the much more difficult, more tedious, and less dramatic remedy, the improvement of the obstetric personnel available for this ante-natal care, and this is a matter of better obstetric education.

Dr. T. J. Hollins: In considering this subject from the point of view of the general practitioner, I shall address myself to the breakdown of the machinery of ante-natal work which is so evident to everybody.

The dictum of an eminent consultant comes into my mind: "Almost everything that has been written in the standard textbooks of medicine is wrong."

An iconoclastic statement like that hits us on the raw, yet it is excellent sauce for our complacency and a counter-irritant to our smugness. In this paper I am going to indulge in an orgy of unorthodoxy and iconoclasm, and only hope that the sting—if sting there is—may be taken out of my remarks by the fact that I am actuated by a sincere desire to help to remove the stigma that at present rests on British obstetrics.

Over twenty years ago a movement was started with the laudable object of reducing maternal mortality and morbidity at childbirth and promoting the birth of healthy, normal children. To-day this movement has assumed the spiritual fervour of a crusade, and is stirring the profession, the laity and the Government. Innumerable meetings are being held to discuss the subject and innumerable articles about it are appearing in the Press. There you may see the opinions of leading philanthropists, of Government officials and Cabinet Ministers freely expressed. To-day an elaborate and costly machinery set up by the Government is in active operation. When the wheels of this machinery first began to revolve everybody thought that we were on the eve of the millennium. In spite of our high hopes we have sadly to confess to complete failure and to a hopeless breakdown in the machinery. The maternal mortality at childbirth is greater now than it was twenty years ago. In 1911, 3·87 mothers out of 1,000 died in their confinement and in 1932 this figure had increased to 4·04 per 1,000. Figures like these force us to confess, whether we like it or not, that the machinery has completely failed and let us down.

Now the question that I shall try to answer in this paper is "What is the cause of this breakdown in the machinery?" Is it the machine that is at fault—this elaborate, costly machine—or is it the hand that guides the machine?

Many attempts have been made to answer this question—some of them suggestive, many containing hints of the truth. In my opinion the cause of the breakdown is, in a word, the methods of examination which are in use to-day. These, in my opinion, are limited in value, uncertain, and unscientific.

Ante-natal examination should be divided into: (I) Ante-natal care—which comprises a general survey of the physical, social, and psychological condition of

the patient; (II) ante-natal examination—which includes abdominal examination and pelvimetry. The value of the one is exceedingly high, the value of the other is exceedingly limited and grossly exaggerated. To elucidate the matter I must briefly enumerate the points which I consider to constitute the minimum of an examination under both these headings.

Ante-natal care.—(1) In the first place the general health and condition of the expectant mother should be assessed, special attention being paid to the state of the teeth and tonsils. If there is any evidence of dental caries she should be referred to the dentist at once. I think it was the late W. W. King, of Sheffield, who pointed out the intimate connexion between puerperal sepsis and the diseased tonsil in the case of the nurse in attendance. What applies to the nurse in attendance applies even more to the patient herself. If dental sepsis or diseased tonsils are present she runs a grave risk of infecting herself, either through the blood-stream or through poisoning her environment.

(2) The urine should be examined periodically—the oftener the better. This will ensure the detection of albuminuria and prevent the onset of nephritis. To allow a woman to progress to the stage of eclampsia, as so often happens to-day, argues criminal neglect on the part of the medical man in attendance.

(3) The heart should be carefully examined, and if any lesion—valvular or otherwise—is found, it should be assessed in terms of the shock and strain which the approaching confinement is bound to cause.

(4) Discharges, if present, should be carefully investigated and treated.

(5) A history of stillbirths must be thoroughly gone into; a Wassermann test must be made; and if the reaction is positive, antisyphilitic treatment must be vigorously pushed.

(6) Last, but not least, the blood-pressure should be taken from time to time. This record is of extreme value as it often gives warning of the onset of the pre-eclamptic state before any clinical signs are present, yet I know of no ante-natal clinic where it is systematically done at present.

These six points constitute the minimum of examination under the head of ante-natal care, and will commend themselves to all as sound precautionary measures to safeguard the patient, and, incidentally, preserve the peace of mind of the practitioner.

Ante-natal examination.—Now let us turn to ante-natal examination proper, i.e. abdominal examination and pelvimetry. This has three objects, namely, to determine (1) the presentation; (2) the size of the child; (3) whether the birth-canal is sufficiently roomy to permit the unassisted passage of the child. This examination is, in intent, diagnostic, in order to give us definite information as to what we will have to deal with later on, and, if reliable, is one of the most valuable aids to be found in any department of medicine; but is it reliable? Does it always give certain information as to the presentation? Does it always enable one to determine the size of the child or to be certain that the birth-canal will accommodate the child? I say emphatically that it does not.

I would like briefly to deal with each of these points.

(1) *The presentation.*—Teachers and textbooks tell us that abdominal examination with its various grips, if properly carried out, leaves no doubt whatever as to the presentation—that, in fact, it is fool-proof. The "fundal grip" will tell you at once if there is a breech at the fundus; if you have any lingering doubts, all you have to do is to move the part about and if it is a breech it will move with the trunk, if a head, independently. The "pelvic grip" will give the same information at the other pole of the uterus. This is all very nice in theory and excellent stuff to feed to

students, but it does not work out so easily in practice. There are many factors which may vitiate your conclusions. The nervous reaction of the highly strung patient or a thick abdominal wall may make a diagnosis well-nigh impossible.

One of the most difficult cases that I ever attended, and one that might easily have ended in disaster, was that of a young woman who had been examined regularly at a certain well-known ante-natal clinic. She was assured that she would have her baby quite easily and on the strength of that assurance did not engage a doctor. She was sent to the nurse, a normal vertex presentation having been diagnosed. After she had been many hours in labour the nurse sent for me, and imagine my horror when I found on arrival an exhausted patient and a face that had not engaged!

The mistakes made by careful practitioners' both in private practice and in the various clinics, are numerous and sometimes disastrous. I will quote, in the exact words of the report, two cases that occurred at one of the most famous centres in the country.

In each case the patient was examined ante-natally by the senior member of the staff—an obstetrician of standing—and the case was delivered later in the hospital attached to the clinic.

(1) A primipara; diagnosis: breech presentation; hard head felt at fundus under sternum; P. V. breech felt well down and fixed. No anæsthetic was given for the examination. Version was not done as the breech was well down and fixed and measurements were satisfactory. At delivery the "breech" was found to be a vertex presentation.

(2) Primipara; diagnosis: vertex L. O. A., with head fixed—some difficulty experienced with P. V. examination, but anæsthetic not given. At delivery a persistent mento-posterior presentation was found, necessitating a craniotomy."

So that the grips are by no means fool-proof.

(2) Determining the size of the child presents much more difficulty than determining the presentation, and is enough to deceive the very elect. The use of abdominal examination here merely leaves one guessing. I quote an illustrative case:—

The wife of a medical colleague was about to have her first baby and engaged the services of a distinguished consultant, who, after making an ante-natal examination, informed the husband that the intercristal diameter was considerably reduced and suggested an induction at the thirty-sixth week. As this was refused, he said that Cæsarean section would have to be performed.

The patient was, herself, a doctor and had done a good deal of ante-natal work. When the consultant called out to his secretary that the intercristal diameter was 16 cm., she knew that a natural birth was practically impossible. A second examination was made ten days before the event, and the consultant now told the husband that he was going to give his wife a chance of having the baby naturally as he had been able to push the head down into the pelvis, and consequently thought the baby undersized. The patient entered the nursing home in due course, and, finding that there were no preparations for a Cæsarean section, insisted that this operation should be performed. Somewhat reluctantly it was carried out. The result was a baby of over 8 lb. which could not possibly have come through the natural passages.

Now if the high priests of the order can be so signally deceived, I think that I am not overstating the case when I say that the possibility of error is so great under the old methods that not even the most expert can pronounce definitely as to the size of the child. The various manœuvres for deciding whether the head will fit into the pelvis—such as the Munro-Kerr method—are comparatively valueless. Even under anæsthesia they are uncertain. In all of them one has to be sure that it is the head

and not the breech that one is trying to fit into the pelvis. In a case that I was asked to see with another doctor, I found him, when I arrived, laboriously trying to fit a breech into an obviously contracted pelvis.

Pelvimetry should be carried out in all cases but I think everyone is prepared to admit that its practical value is greatly exaggerated. A few years ago I had a series of patients in cases of persistent occipito-posterior presentation, examined by X-rays after parturition. In all of them I found either a narrowing of the true conjugate or narrowing of some diameter, though externally the measurements in all of them were normal or in excess of normal. This would seem to indicate that pelvimetry is of very limited application.

Clinically, I venture to say, we have all found this to be the case over and over again. The case which we expected to cause the greatest trouble comes off with the greatest ease whilst, in the case in which the measurements had led us to expect a comfortable time, delivery has been effected with the greatest difficulty. I had a case of this kind about a fortnight ago. The interspinous and intercristal measurements were well below normal and I felt considerable anxiety, but the woman delivered herself of a seven-pound baby in three hours with the greatest ease.

From what I have said you will gather that I am not a great believer in the present methods of ante-natal examination. The man who relies on them is like the motorist who dashes over a cross-roads at sixty miles an hour, relying on his hooter to get him across safely. He may get to the other side without a crash, but the odds are heavily against him. The man who uses these methods alone is heading for a crash, for to my mind, as I mentioned at the beginning of my paper, they are the greatest factor in bringing about the breakdown in the machinery.

In conclusion I would like to turn for a moment from destructive criticism to constructive suggestion. If the old methods are unscientific and uncertain, is there any substitute, any remedy? I think there is. I believe it possible in every case to tell with exact certainty the presentation, the size of the baby, the relative size of the head and the pelvis, and the internal measurements of the pelvis itself, and that desideratum can be achieved and achieved only by the use of X-rays in all cases of primiparæ, and in all cases of multiparæ when there has been difficulty at a previous confinement. Let us use the old methods, by all means, if we wish, but let us supplement them by X-ray examination.

Furthermore, it is essential that the ante-natal findings should be checked by the findings at delivery. Only thus can one learn one's job and, by confirming or disproving one's previous opinion, become expert.

Lastly, I think that continuity of attendance is imperative. The practitioner who makes the ante-natal examination should be in attendance at the confinement. The personal element is here of great importance. The practitioner who makes an ante-natal examination of a patient whom he is later to attend is likely to exercise more care and skill and take a more personal interest than one who makes the ante-natal examination and does nothing else. This continuity would eliminate slackness which is all too common in ante-natal work.

To summarize: The use of X-rays in all cases as defined above, and the comparison of findings before and after the event, combined with continuity of attendance would, I believe, go a long way to solve the problem under consideration, and would tend largely to reduce maternal mortality at childbirth and remove the stigma which has lain so long on British obstetrics.

Professor F. J. Browne: Mr. Gibberd has referred to the difficulty of reducing an already fairly low maternal death-rate. But the Departmental Committee found that about half of all maternal deaths were preventable, and in spite

of Mr. Gibberd I still ask, "if preventable why not prevented"? The Committee obtained its information by the study of individual reports of maternal deaths received from doctors throughout the country, and members of the Committee know what lack of judgment and of ordinary competence hundreds of these reports revealed. It is impossible to believe that unless we are to rest satisfied with such happenings as were here revealed, it is so difficult to reduce the maternal death-rate materially below the figure at which it has stood for at least the last thirty years.

In considering how the results of ante-natal care can be improved we may begin by enunciating certain propositions on which there will be general agreement: (1) The best ante-natal care is of little use unless it is implemented by competent care during and after delivery; (2) ante-natal, intra-natal and post-natal care should be carried out by the same person; (3) no amount of mere organization will bring about an appreciable reduction of maternal mortality unless there is at the same time an improvement in the personnel of the service.

Four maternity services have been recently before the public: (1) The B.M.A. scheme; (2) the scheme of the Departmental Committee on Maternal Mortality and Morbidity; (3) Professor Blair-Bell's scheme; (4) that of Professor Munro Kerr. All four envisage a service in which, in the normal case, the patient shall be delivered by a midwife who shall call in the patient's own doctor when necessary; a general practitioner who shall supervise the ante-natal care and go to the help of the midwife should difficulty arise; a specialist, who *may* be called in by the practitioner in case of a difficulty with which he feels incompetent to deal, or which he fails to overcome, and finally, a hospital which the patient may enter, or to which she may be removed should her home be unsuitable. There are, in addition, various accessory services that are relatively unimportant, and of which even the full use can add comparatively little to the safety of childbirth.

Now in this chain of services there is, if we retain the present personnel, scarcely a strong link. We know that the midwives are insufficiently trained, that the standard of preliminary education and admission to the roll of the Central Midwives Board is deplorably low, and that the examination for the certificate is inadequate. The specialist is excellent if he has had a prolonged obstetrical training, still practises midwifery, and is easily accessible and quickly available, but there are many large and populous centres in industrial England and Wales to-day, and whole counties where no specialist is resident. If an emergency arises he has to come a long distance, often as far as fifty miles. Is it any wonder that in many cases he is not called in, or does not arrive till the patient is beyond salvation? Too often, too, the specialist's chief interest lies in general surgery rather than in obstetrics, which he himself does not practise; and he has little experience of, or interest in, the art of midwifery, except to terminate a case by Cæsarean section. Too often, when the patient is removed to hospital after futile attempts at delivery, she is treated by an inexperienced house-surgeon with no personal supervision by a senior member of the staff.

The fourth weak link in the chain is the general practitioner. After most careful consideration I feel compelled to say that the midwifery service of the country might be enormously improved if it were removed from the sphere of general practice altogether, that no appreciable improvement can be effected as long as there is a general-practitioner service, and that midwifery and general practice are incompatible.

In the first place it is impossible to train the medical student to become a competent obstetrician, a process which requires at least three years in a large maternity hospital. Professor Munro Kerr recognized this, though I consider his proposal of four months intern post-graduate training to be inadequate. Few general practitioners have had any post-graduate resident or intern experience, and they must

therefore get that experience after entering practice, and at the expense of their patients. Many never obtain it at all, for few general practices provide more than fifty cases of midwifery annually, with only an occasional abnormality, and the four or five abnormalities will probably be of different type.

Secondly, the general practitioner's work, especially in industrial areas, is such that it is often necessary to dress three or four septic wounds daily, after which he may have to attend a case of midwifery with grave risk of conveying serious sepsis.

Thirdly, midwifery is incompatible with general practice because it comes at irregular times, and so interferes with other urgent work, the claims of which often necessitate dangerous haste in the conduct of a delivery.

It is probable that few general practitioners would resent the loss of midwifery, for much of it happens at night and interferes with rest and leisure; it is usually very badly paid, and entails heavy responsibility without any corresponding reward. How often do we see in advertisements of practices for sale the words "No midwifery," as a bait to a possible buyer! It is true that some practitioners are "keen on midwifery," but unfortunately keenness is no guarantee of competence.

That keenness is not the rule is shown by the following statement of a county medical officer who wrote to me recently:—

> "The ante natal clinics were at first run by general practitioners, but they were so indifferent we had to appoint whole-time officers in charge. The whole-time system is becoming increasingly popular with midwives and mothers. It has been our custom to inform the doctor of the proceedings at the clinics, and to invite coöperation, but it is so seldom that my officers get any replies to their notes that I can only assume that general practitioners are not interested in this work."

Besides, pure medicine to-day has, within its legitimate bounds, become so complex and difficult, that its complete practice, without the inclusion of allied subjects such as obstetrics, calls for the exercise of an energy and intelligence almost superhuman. In this respect the practice of to-day is utterly different from that of Smellie's time, and corresponding readjustments are essential.

There is nothing revolutionary in the proposal to take midwifery out of the sphere of general practice. Tuberculosis has long since been taken out and the same is true of venereal diseases, in each of which a specialist service has been set up.

A Scheme Outlined

The proposal here outlined is designed to strengthen every link in the chain of maternity services by establishing in each county of England and Wales a maternity unit, staffed by whole-time medical officers and midwives, all highly trained and experienced, and at their head a director, responsible for the whole.

(1) In each county there would be a primary centre which should be situated at the county town, and be in connexion with the general hospital so that overhead running costs might be reduced, and all special facilities, including consultations with experts in the various special branches of medicine, be readily available. This primary centre should have at least fifty maternity beds and some beds for gynæcological work arising out of childbirth, and that alone. Here on the premises should live the director, a first assistant and other junior assistants and house surgeons.

(2) For a five- or ten-mile radius around the primary centre there should be a district in which domiciliary practice is carried on. The nurse-midwives who would chiefly be responsible for this would live at the primary centre. Ante-natal clinics would be carried on at the primary centre and at subsidiary stations in the district.

Any case likely to present difficulty (and possibly all primiparæ, as Munro Kerr suggests) would be advised to come into hospital. Should difficulty arise at a delivery in spite of this sifting, the midwife would call in one of the officers of the primary unit.

(3) At suitable points outside the five- or ten-mile radius, secondary centres should be set up, each containing a smaller number of beds than the primary centre, but also in connexion with a general hospital. These would sometimes be of the type of the cottage hospital but often larger. In each secondary centre would reside a whole-time officer of the standing of first assistant, and one or more junior officers. This would form the centre of a secondary district in which domiciliary practice would be carried on by midwives, in exactly the same way and with the same ready and skilled assistance at hand in case of difficulty or emergency, as in the primary district.

The most grave cases from the county area might come into the primary centre.

The work of the entire county would be coördinated by the director of the county unit.

(4) *The staff.*—This would consist of a director, first assistant, junior assistants, house surgeons, midwives and home helps.

(*a*) The director: The duties have been already stated. Qualifications should be exceptionally high, and in this connexion less weight should be attached to academic attainments and qualifications than to proof of experience and competence. He should have had at least five years' experience in a large maternity hospital and should be a competent gynæcological surgeon. The question as to whether he should be allowed to do private work, either both obstetrical and gynæcological, or gynæcological only, is a matter for consideration and might be differently decided according to local conditions. The best type of obstetrician must be attracted to these posts, and they must therefore be highly paid. A salary of £1,500 a year is contemplated, with a house in addition. To the right type of person not the emoluments but the interest of the work would be the chief consideration.

(*b*) The first assistants: These must also be highly trained; at least three years' experience in a large maternity hospital should be required. Gynæcological experience and operating skill would not be necessary, but as each first assistant might carry a directorship in his pocket it would for his own sake be desirable, else promotion might never come. As every first assistant could not ultimately become a director, because of the comparatively few openings available, first assistantships should in themselves be made attractive careers. The salary should be graded, and go up to at least £1,200 a year at the retiring age (with house or quarters).

(*c*) Junior assistants: These might be less experienced, and would, like house surgeons, work under supervision by the senior officer. In course of time the first assistant staff might be recruited from the junior officers at the primary centre, which would be a useful training ground.

(*d*) Midwives: The conditions of service should be such as would attract a good type of woman, in so far as social standing, education, and intelligence are concerned. The service should be whole-time, well paid, and with a pension attached. The midwives should have had a general training and post-certificate experience in hospital and district. Periods of indoor service in the primary centre might usefully alternate with domiciliary work in order to stimulate interest and keep up to date. In general, the midwives would live at the centre, primary or secondary, but in certain cases, as, for example, where the district was unusually large, it might be convenient that some should live at outlying points, so as to be within easy reach of their practice. Where necessary, transport by a small car should be available.

(*e*) Home helps: A registry of these should be kept. They should be available, not only to go out to the mothers in the lying-in period, but also, in many cases—especially where the woman had already a large family of small children and could not afford to pay for domestic assistance—for six weeks or a month before delivery, so that much-needed rest might be obtained.

(5) An annual report should be issued by each county unit. These should be standardized so as to be comparable. The idea is that a spirit of healthy rivalry should be engendered, though it is recognized that in some counties the problem of rendering childbirth safe would be simpler than in others.

(6) Appointments to the staffs should be carefully controlled in order to ensure that merit alone counted. This might be best effected by a central appointments advisory committee whom the Minister of Health would consult.

(7) A certain number of patients would still choose to be looked after by their own doctor—probably a gradually diminishing proportion, as confidence in the maternity units increased. The influence of the high standard of work in the units could not but beneficially influence that in general practice.

(8) Cost: It is estimated that the full scheme here outlined would cost two million pounds a year. The cost of the B.M.A. scheme was estimated at two and a quarter millions. The scheme could be made partly contributory and self-supporting. Insured persons and the dependants of such should contribute part of the maternity benefit to help to pay for the services rendered, and many might pay more. If single-bed wards were provided at the centres, no doubt many of the better-class patients would be willing to pay a moderate weekly fee, say seven guineas, for the privilege of privacy. As the average patient's upkeep costs about three guineas or less, the surplus would help to pay for those whose contribution was small.

I would suggest that the scheme be tried first in one county, though, of course, it could only be introduced with the approval of the Minister of Health.

This scheme has the advantage, amongst others, that it cuts at the roots of divided responsibility, and that it unifies, by bringing under a single control, the multiplicity of agencies at present responsible for maternity service—what Dr. Cameron has called an "ill-knit organization."

Dr. A. Joseph Wrigley said that he emphatically disagreed with Mr. Gibberd, whose pessimism was not justified. In many districts in the country, where an efficient maternity service was in being, the maternal mortality had been greatly reduced. He personally knew of one borough, just south of London, where this was the case.

He also disagreed with a previous speaker who claimed that an X-ray examination, in the ante-natal period, of every woman would be of benefit. On the contrary, much trouble might be found that did not exist, and more harm than good would be done. He strongly approved of ante-natal work if it was done properly and if the search for the abnormal did not mask the preservation of the normal. A recent article of his had been only half-read by a number of people who had, quite wrongly, accused him of decrying the value of all ante-natal supervision. This, of course, he had never done.

Mr. W. H. F. Oxley said he had practised both before and after ante-natal care was used, and he was fully convinced that it was of great value. In his hospital it was closely co-ordinated with the care of labour and the puerperium, and its full value was thus obtained.

Its value had, however, been much exaggerated; he would put it down as 5%, and good midwifery at the time of labour as 95%. An enormous amount of money

was being spent on ante-natal care which by itself was useless, and nothing had been done to improve the treatment of labour. Thirty years ago a large number of general practitioners were extremely good obstetricians; a large portion of the work had been taken from them, yet they were still depended upon for abnormal cases attended by midwives.

He had spent many years in an attempt to prove that, by a system of controlled midwives, general practitioners, and a hospital into which all abnormalities could be admitted, maternal mortality could be reduced, and the results showed a phenomenal success. A similar system should be applied to the whole country.

Professor Browne's suggested scheme was totally impracticable; if a midwife had a case of post-partum hæmorrhage and the only doctor competent to deal with it was five miles away, the patient would be dead before he got there; moreover, in straggling areas the whole-time obstetrician might be much further away than five miles.

Dr. G. W. Theobald said there was no reason to assume that ante-natal care could, however well carried out, lower maternal mortality, for it was no substitute for good midwifery. On the other hand, it could be definitely harmful, as it made meddlesome midwifery almost inevitable. He felt certain that the mortality rate in childbirth would increase during this decade. Nevertheless he believed that the rate could be halved if some sixty hospitals modelled on the Rotunda pattern were placed at suitable intervals throughout the country, and administrative authorities would grasp the potentialities of modern transport.

Mr. L. C. Rivett said that obstetrics should be a whole-time job, and was incompatible with general practice and with gynæcological surgery, and that anyone attending cases of peritonitis, pyosalpinx, whitlows, boils, or other septic conditions or diseases should be debarred from attending women during labour. The general practitioner could not afford time, in the midst of visiting and surgery hours, to conduct labour efficiently. Labour required a great deal of patience, and too frequently forceps was applied to terminate a labour so as to enable the practitioner to get on to another job, or to get some rest in preparation for the next day's work.

Dr. W. M. Feldman said that although half of 1% was, *relatively*, a very small mortality, nevertheless it was *absolutely* much too high, in view of the fact that parturition was a physiological act and should have no mortality at all. Moreover, the rate was rising; indeed the rise was higher than a comparison of present-day figures with those of some years ago would seem to suggest. Thus the figure of 3·17 per thousand of some fifty years ago, given by one of the speakers, was the number of maternal deaths per 1,000 infants born *alive*, while the 4·5 per 1,000 of last year was the number of maternal deaths per 1,000 of *all* births, the latter figure would be higher still if the denominator referred to live births only.

He agreed with Dr. Hollins that X-ray examination near term would safeguard the woman against the mistakes [of which he gave examples] frequently made by obstetricians of the highest eminence, in respect to the position of the fœtus and the relative measurements of the passenger and the maternal passages. He urged the installation of X-ray outfits at every ante-natal clinic. He believed that endogenous toxæmia was responsible for a portion of maternal deaths from septicæmia, but it would be dangerous to lay too much stress on septic tonsils, to which Dr. Hollins had referred, because probably every woman's tonsils would be condemned to removal, and whilst the maternal mortality from childbirth would thus be reduced, the ante-natal maternal mortality consequent on the operation would probably be more than correspondingly increased.

In view of the reference to the Dublin Rotunda Hospital system of midwifery training, to which one speaker had referred so eulogistically, he (Dr. Feldman) would like to know whether the maternal mortality figures in the Irish Free State were lower than those in this country.

With regard to Professor Browne's scheme, he believed that, even if it was workable, one could not hope that it would reduce the maternal mortality to less than about three per 1,000. This would mean a saving of some 1,000 mothers a year at an expenditure of at least £2,000,000 a year, i.e. at a cost of some £2,000 per mother, which, he thought, the State might consider somewhat too high a price to pay.

Professor James Young said that he could not subscribe to the spirit of pessimism and, in some instances, of panic that animated much of the discussion. He himself believed that, if, instead of being discouraged by the slow response to the present methods, they devoted their energies to carrying out the simple propositions laid down by the Maternal Mortality Committee, they might look forward with confidence to an alleviation of the existing unsatisfactory conditions. They had to remember that it was only two years since the appearance of the final report of this Committee.

The maternal death-rate was a compound of very varying figures. In some districts it was 2 per 1,000, whilst in others it went up to 10 or even 12 per 1,000, and it was the high rates that maintained the unduly high average. He was satisfied that, if zealous efforts were made to bring within reach of the "black spots" the skill and the experience that existed in the country, a marked improvement would rapidly be effected. He was encouraged in this belief because already there was evidence in scattered regions that where the proposals of the Maternal Mortality Committee were put into operation the death-rate had fallen. He referred specially to Rochdale, which some years ago had the highest maternal death-rate in the country (averaging nearly 9 per 1,000 over five years), and where now the death-rate had fallen below 3 per 1,000 and during 1932 was under 2 per 1,000.

Lady Barrett said that, without entering into discussion as to whether the midwifery of the country should be done entirely by obstetric specialists or by general practitioners, two points seemed clear:—

(1) That a better and more practical education, with post-graduate experience, should be given to those who did this work, and (2) that the doctor responsible for the ante- and post-natal care of mothers should be the doctor in charge of the maternity beds or the accoucheur in the home.

Apart from these conditions, no real advance would be made in the preventive value of ante-natal care.

Dr. G. Dick Read said he agreed that, with the present knowledge and the organization for midwifery services, it was difficult to visualize any decrease in the maternal mortality beyond its present rate of less than one half per cent.

The suggestions that had been made appeared to imply that the present standard of knowledge of obstetrics had reached its apex. He suggested, however, that there was still much to learn.

He would call attention to the teaching which regarded childbirth as a natural phenomenon, and investigated it from the point of view of learning what Nature really intended during pregnancy and parturition. He would emphasize the

importance of a fuller understanding of the neuromuscular harmony essential for all the emotional, metabolic and mechanical changes which occurred during normal pregnancy, parturition and the puerperium.

During the ante-natal period, efforts should be made to establish a normal harmony of the working of the woman's mind and body. This required a philosophical outlook rather than an academical. Many of the unexpected complications of apparently normal labour, which had been referred to by several speakers, might be foreseen and prevented if these reactions were more clearly understood.

Malpresentations, uterine inertia, tears of the cervix and perineum, post-partum hæmorrhage and puerperal sepsis were all, within reasonable limits, attributable to the imposition of cultural influences upon a natural mechanism and function. He felt sure that, in time, obstetricians and midwives would learn the meaning and importance of natural neuromuscular harmony and endeavour to stabilize that harmony during the ante-natal period. Where this effort at stabilization was being carried out its value was already recognized, and statistics showed a definite decrease in the number of complicated labours. To procure natural childbirth, in its fullest and most scientific detail, was a means of saving the lives of many mothers.